

SAP HANA Platform  
Document Version: 9.1 – 2015-02-16

# What's New in the SAP HANA Platform (Release Notes)



# Content

<b>1</b>	<b>What's New in the SAP HANA Platform (Release Notes).</b>	<b>7</b>
<b>2</b>	<b>SAP HANA Platform SPS 09, Features Included in Revision 93.</b>	<b>8</b>
2.1	Installation and Update.	8
	SAP HANA Answers (Changed).	8
2.2	Development.	8
	SAP HANA SQL and System Views (New and Changed).	9
<b>3</b>	<b>SAP HANA Platform SPS 09, Features Included in Revision 90.</b>	<b>10</b>
3.1	SAP HANA Documentation Set Changes.	11
3.2	SAP HANA Multitenant Database Containers.	12
	SAP HANA Server Installation and Update (New).	13
	SAP HANA Cross-Database Access (New).	13
	SAP HANA Security (New and Changed).	14
	SAP HANA System Administration (New and Changed).	16
	SAP HANA SQL (New and Changed).	18
	SAP HANA System Views (New and Changed).	20
3.3	Installation and Update.	21
	Documentation Changes.	21
	SAP HANA Server Installation and Update (New and Changed).	23
	SAP HANA Studio Installation (New and Changed).	23
	SAP HANA Answers (New and Changed).	24
3.4	Security.	25
	SAP HANA Security (New and Changed).	25
3.5	System Administration.	27
	Documentation Changes.	27
	SAP HANA System Administration (New and Changed).	28
	SAP HANA Backup and Recovery (New).	33
	SAP HANA High Availability and Disaster Recovery (New and Changed).	33
	Performance Monitoring (New and Changed).	34
3.6	Data Provisioning.	35
	SAP HANA Smart Data Access.	35
	SAP HANA Hadoop Integration.	36
3.7	Development.	36
	Documentation Changes.	36
	SAP HANA Modeling (New and Changed).	37
	SAP HANA SQL Command Network Protocol (New).	39

	SAP HANA Extended Application Services (New and Changed).	39
	SAP HANA UI Integration Services (New and Changed).	43
	SAP HANA Interactive Education (SHINE) (New and Changed).	44
	SAP HANA Application Function Modeler (New and Changed).	45
	SAP HANA Application Lifecycle Management (New and Changed).	45
	SAP HANA Series Data (New).	46
	SAP HANA SQLScript (New).	47
	SAP HANA SQL Syntax (New and Changed).	47
<b>4</b>	<b>SAP HANA Platform SPS 08, Features Included in Revision 82</b>	<b>48</b>
4.1	Development.	48
	SAP HANA Interactive Education (SHINE) (New and Changed).	48
<b>5</b>	<b>SAP HANA Platform SPS 08, Features Included in Revision 80</b>	<b>49</b>
5.1	Installation and Update.	49
	Documentation Changes.	49
	SAP HANA Server Installation and Update (New and Changed).	51
	SAP HANA Studio Installation (New and Changed).	51
	SAP HANA Client Installation (New).	52
5.2	Security.	53
	Security in the SAP HANA Database (New and Changed).	53
	Security Administration (Changed).	55
5.3	System Administration.	55
	Documentation Changes.	55
	System Administration (New and Changed).	56
	High Availability and Disaster Recovery (New and Changed).	61
	Performance (New and Changed).	62
5.4	Data Provisioning.	63
	Log-Based Replication with SAP Replication Server (New and Changed).	63
	SAP HANA Smart Data Access.	63
	Unified Data Provisioning (Deprecated).	64
5.5	Development.	64
	Documentation Changes.	64
	SAP HANA Modeling (New and Changed).	65
	SAP HANA Spatial (New and Changed).	66
	SAP HANA Extended Application Services (New and Changed).	67
	SAP HANA Predictive Analysis Library (New and Changed).	71
	SAPUI5 (Changed).	72
	File Loader for SAP HANA (New).	73
	SAP HANA Data Provider for Microsoft ADO.NET	73
	SAP HANA Interactive Education (SHINE) (New and Changed).	74
	SAP HANA LCM Tools (New).	74

<b>6</b>	<b>SAP HANA Platform SPS 07, Features Included in Revision 73.</b>	<b>76</b>
6.1	Development.	76
	SAP HANA Interactive Education (SHINE) New and Changed.	76
	SAP HANA UI Integration Services (New and Changed).	76
6.2	Data Provisioning.	77
	SAP Smart Data Access (SAP SDA) adapter for SAP Manufacturing Integration and Intelligence (SAP MII) (New).	77
<b>7</b>	<b>SAP HANA Platform SPS 07, Features Included in Revision 70.</b>	<b>78</b>
7.1	Installation and Update	78
	Documentation Changes.	78
	SAP HANA Lifecycle Management Tools hdblocm and hdblocmgui (New).	80
	SAP HANA Studio Installation (Changed).	80
	SAP HANA Client Installation (Changed).	80
	SAP HANA Lifecycle Manager (Changed).	81
	SAP HANA Unified Installer (Deprecated).	81
7.2	Security.	81
	SAP HANA Security (New and Changed).	82
7.3	System Administration.	84
	Documentation Changes.	85
	SAP HANA System Administration (New and Changed).	86
	SAP HANA Backup and Recovery (New and Changed).	88
	SAP HANA Availability and Scalability (New and Changed).	91
7.4	Data Provisioning.	92
	Smart Data Access.	92
7.5	Development.	93
	SAP HANA Extended Application Services (New and Changed).	93
	SAP HANA Modeler (New and Changed).	97
	SAP HANA SQL Reference (New and Changed).	99
	SAP HANA Spatial Reference (New).	102
	SAP HANA System Views (New and Changed).	102
	SAP HANA SQLScript Editor (New and Changed).	103
	SAP HANA SQLScript Debugger (New and Changed).	104
	SAP HANA UI Integration Services (New and Changed).	104
	SAP HANA Predictive Analysis Library (New and Changed).	105
	Text Analysis (New).	106
	Full Text Search (New and Changed).	107
	Fuzzy Search (New).	108
<b>8</b>	<b>SAP HANA Platform SPS 06, Features Included in Revision 61.</b>	<b>110</b>
8.1	Security.	110
	SAP HANA Security.	110

8.2	Development. . . . .	110
	Documentation Changes. . . . .	110
<b>9</b>	<b>SAP HANA Platform SPS 06, Features Included in Revision 60. . . . .</b>	<b>112</b>
9.1	Installation and Update. . . . .	112
	Documentation Changes. . . . .	112
	SAP HANA Lifecycle Manager (New). . . . .	114
9.2	Security. . . . .	115
	SAP HANA Security. . . . .	115
9.3	System Administration. . . . .	118
	SAP HANA Administration. . . . .	118
	SAP HANA Backup and Recovery. . . . .	121
9.4	Data Provisioning. . . . .	123
	Unified Data Provisioning (New). . . . .	123
	SAP HANA Smart Data Access (New). . . . .	124
9.5	Development. . . . .	124
	Documentation Changes. . . . .	125
	SAP HANA Extended Application Services (New and Changed). . . . .	125
	SAP HANA Modeler (New and Changed). . . . .	130
	SAP HANA SQLScript Editor (New). . . . .	131
	SAP HANA SQLScript Debugger (New and Changed). . . . .	132
	SAP HANA SQLScript (New). . . . .	132
	SAP HANA Application Function Modeler (New). . . . .	133
	UI Development Toolkit for HTML5 (New and Enhanced). . . . .	133
	SAP HANA UI Integration Services (Changed). . . . .	134
	Full Text Search (New). . . . .	134
	Fuzzy Search (New and Changed). . . . .	134
	Text Analysis (New and Changed). . . . .	135
	SAP HANA Info Access for Search UIs (New and Changed). . . . .	137
	SAP HANA SQL (New and Changed). . . . .	137
	SAP HANA System Views (New and Changed). . . . .	140
	SAP HANA Predictive Analysis Library (Changed). . . . .	142
<b>10</b>	<b>SAP HANA Appliance Software SPS 05, Features Included in Revision 47. . . . .</b>	<b>143</b>
10.1	Installation and Update. . . . .	143
	SAP HANA Platform Edition. . . . .	143
10.2	Security. . . . .	143
	SAP HANA Security Features (New). . . . .	143
10.3	Development. . . . .	144
	SAP HANA Modeler (New). . . . .	144
	Local Table Types in SQLScript Editor (New). . . . .	144
	SAP HANA UI Integration Services (New). . . . .	144

<b>11</b>	<b>SAP HANA Appliance Software SPS 05, Features Included in Revision 45. . . . .</b>	<b>146</b>
11.1	Installation and Update. . . . .	146
	Documentation Changes. . . . .	146
	SAP HANA Studio Installation (Changed). . . . .	147
	SAP HANA Appliance Software Enterprise Extended Edition (Deprecated). . . . .	147
	SAP HANA Installation with SAP HANA Unified Installer (New & Changed). . . . .	148
	SAP HANA Automated Update with Software Update Manager (New & Changed). . . . .	148
11.2	Security. . . . .	149
	SAP HANA Security Features (New & Changed). . . . .	149
11.3	System Administration. . . . .	151
	Documentation Changes. . . . .	151
	SAP HANA Database Backup and Recovery (New and Changed). . . . .	152
	SAP HANA Administration (New & Changed). . . . .	152
11.4	Data Provisioning and Data Modeling. . . . .	156
	Documentation Changes. . . . .	156
	Trigger-Based Replication (SAP Landscape Transformation (LT) Replication Server). . . . .	156
11.5	Development. . . . .	156
	UI Development Toolkit for HTML5 (new). . . . .	157
	Building Search Apps Using the UI Toolkit for Info Access (Changed). . . . .	157
	Documentation Changes. . . . .	157
	SAP HANA SQL (Changed). . . . .	158
	SAP HANA Modeler (New and Changed). . . . .	160
	Text Analysis (New). . . . .	160
	SAP HANA SQLScript Editor (New). . . . .	161
	Fuzzy Search (Changed). . . . .	161
	SAP HANA SQLScript Debugger (New). . . . .	162
	SAP HANA System Tables and Monitoring View (Changed). . . . .	162
	Full Text Search (Changed). . . . .	163
	SAP HANA Extended Application Services (New and Changed). . . . .	163
	SAP HANA SQLScript (Changed). . . . .	168
<b>12</b>	<b>Related Information. . . . .</b>	<b>169</b>
12.1	Important SAP Notes. . . . .	169

# 1 What's New in the SAP HANA Platform (Release Notes)

Use this document to find out about new and enhanced features of the SAP HANA Platform in support package stacks (SPSs).

Table 1:

Support Package Stack (SPS)	First Released with Revision...
09	90
08	80
07	70
06	60
05	45

The document *What's New in the SAP HANA Platform (Release Notes)* accumulates the features of all SAP HANA support package stacks (SPS) and corresponding revisions. You will find all SAP HANA Platform features starting with SAP HANA Appliance Software SPS 05 (Revision 45) up to the current SAP HANA Platform support package stack and revision.

For information about the SAP HANA release strategy and for a detailed explanation of SAP HANA revisions, support package stacks, maintenance revisions and datacenter service points and their frequency, see the document *SAP HANA Revision Strategy* on SAP Service Marketplace.

To find out about issues that have been fixed in a specific revision, see the SAP Note of that revision on SAP Service Marketplace.

## Related Information

[SAP HANA Platform documentation set on SAP Help Portal](#)

[SAP HANA Revision Strategy](#) 

[SAP HANA SPS 09 Release Note 2075266](#) 

[SAP Notes search](#) 

---

## 2 SAP HANA Platform SPS 09, Features Included in Revision 93

### 2.1 Installation and Update

#### 2.1.1 SAP HANA Answers (Changed)

As of SAP HANA SPS Platform 09 (Revision 93), the following changes are available for SAP HANA Answers.

SAP HANA Answers has been discontinued and is no longer automatically installed.

For more information see *SAP Note 2090744*.

#### Related Information

[SAP Note 2090744](#) 

### 2.2 Development



---

## 2.2.1 SAP HANA SQL and System Views (New and Changed)

As of SAP HANA SPS Platform 09 (Revision 93), the following documentation changes are available for the SAP HANA SQL and System Views Reference.

### Documentation Changes

The SAP HANA SQL and Systems Views reference has been restructured and now includes separate sections with the SQL syntax and System Views specific to the following SAP HANA Options:

- SAP HANA Dynamic Tiering
- SAP HANA Enterprise Information Management
- SAP HANA Smart Data Streaming

# 3 SAP HANA Platform SPS 09, Features Included in Revision 90

As of SAP HANA Platform SPS 09 (Revision 90), new features and enhancements are provided for installation, security, administration, data provisioning and development. SAP HANA options are introduced providing additional functions that can be used together with the SAP HANA base edition, based on dedicated SAP HANA option licenses.

- New features and enhancements for SAP HANA platform are described in this *What's New in SAP HANA Platform (Release Notes)* document.
- New features and enhancements for SAP HANA options are described in separate What's New (Release Notes) documents (see Related Information).

## Caution

There are several types of licenses available for SAP HANA. Depending on the license type of your SAP HANA installation, some of the features and tools that are described in the SAP HANA platform documentation may only be available via the SAP HANA options, which may be released independently of an SAP HANA Platform Support Package Stack (SPS). Although various features included in SAP HANA options are cited in the SAP HANA platform documentation, customers who only purchased the license for the base edition of the SAP HANA platform do not have the right to use features included in SAP HANA options, because these features are not included in the license of the base edition of the SAP HANA platform. For customers to whom these license restrictions apply, the use of features included in SAP HANA options in a production system requires purchasing the corresponding software license(s) from SAP. The documentation for the SAP HANA optional components is available in SAP Help Portal at [http://help.sap.com/hana\\_options](http://help.sap.com/hana_options). For more information, see also [SAP Note 2091815 - SAP HANA Options](#). If you have additional questions about what your particular license provides, or wish to discuss licensing features available in SAP HANA options, please contact your SAP account team representative.

For more information about SAP HANA options, see *SAP HANA Platform Software Components* in the *SAP HANA Master Guide*.

## Related Information

[What's New in SAP HANA Accelerator for SAP ASE \(Release Notes\)](#)  
[What's New in SAP HANA Advanced Data Processing \(Release Notes\)](#)  
[What's New in SAP HANA Dynamic Tiering \(Release Notes\)](#)  
[What's New in SAP HANA Enterprise Information Management \(Release Notes\)](#)  
[What's New in SAP HANA Predictive \(Release Notes\)](#)  
[What's New in SAP HANA Real-Time Replication \(Release Notes\)](#)  
[What's New in SAP HANA Smart Data Streaming \(Release Notes\)](#)  
[What's New in SAP HANA Spatial \(Release Notes\)](#)  
[What's New in SAP HANA Advanced Data Processing \(Release Notes\)](#)

[What's New in SAP HANA Dynamic Tiering \(Release Notes\)](#)  
[What's New in SAP HANA Enterprise Information Management \(Release Notes\)](#)  
[What's New in SAP HANA Predictive \(Release Notes\)](#)  
[What's New in SAP HANA Real-Time Replication \(Release Notes\)](#)  
[What's New in SAP HANA Smart Data Streaming \(Release Notes\)](#)  
[What's New in SAP HANA Spatial \(Release Notes\)](#)  
[SAP HANA Master Guide](#)

## 3.1 SAP HANA Documentation Set Changes

As of SAP HANA Platform SPS 09, Revision 90 the structure of the SAP HANA documentation set on SAP Help Portal changed significantly based on the new licensing for SAP HANA options.

SAP HANA options provide additional functions you can use together with the SAP HANA base edition. To use the SAP HANA options you need a dedicated license for the options you want to use.

### Caution

There are several types of licenses available for SAP HANA. Depending on the license type of your SAP HANA installation, some of the features and tools that are described in the SAP HANA platform documentation may only be available via the SAP HANA options, which may be released independently of an SAP HANA Platform Support Package Stack (SPS). Although various features included in SAP HANA options are cited in the SAP HANA platform documentation, customers who only purchased the license for the base edition of the SAP HANA platform do not have the right to use features included in SAP HANA options, because these features are not included in the license of the base edition of the SAP HANA platform. For customers to whom these license restrictions apply, the use of features included in SAP HANA options in a production system requires purchasing the corresponding software license(s) from SAP. The documentation for the SAP HANA optional components is available in SAP Help Portal at [http://help.sap.com/hana\\_options](http://help.sap.com/hana_options). For more information, see also [SAP Note 2091815 - SAP HANA Options](#). If you have additional questions about what your particular license provides, or wish to discuss licensing features available in SAP HANA options, please contact your SAP account team representative.

Documentation sets for SAP HANA options are now available on separate SAP Help Portal pages:

- [SAP HANA Options](#)
  - [SAP HANA Accelerator for SAP ASE](#)
  - [SAP HANA Advanced Data Processing](#)
  - [SAP HANA Dynamic Tiering](#)
  - [SAP HANA Enterprise Information Management](#)
  - [SAP HANA Predictive](#)
  - [SAP HANA Real-Time Replication](#)
  - [SAP HANA Smart Data Streaming](#)
  - [SAP HANA Spatial](#)

For more information about specific documentation changes for the SAP HANA platform documentation, see the respective documentation area in this What's new (Release Notes) document.

---

For more information about SAP HANA options, see *SAP HANA Platform Software Components* in the *SAP HANA Master Guide*.

## Related Information

[SAP HANA Master Guide](#)

## 3.2 SAP HANA Multitenant Database Containers

As of SAP HANA Platform SPS 09 (Revision 90), SAP HANA supports multiple isolated databases or *multitenant database containers* in a single SAP HANA system for on-premise MCOS (multiple components in one system) scenarios.

### What are SAP HANA Multitenant Database Containers?

An SAP HANA system can now be installed in *multiple-container mode*, which means it is capable of containing *multitenant database containers*. Otherwise, it is a single-container system. A multiple-container system always has exactly one *system database* and any number of multitenant database containers (including zero), also called *tenant databases*. An SAP HANA system installed in multiple-container mode is identified by a single system ID (SID). Database containers are identified by a SID and a database name. From the administration perspective, there is a distinction between tasks performed at system level and those performed at database level.

Database clients, such as the SAP HANA studio, can connect to specific databases.

All the databases in the same multiple-container system share the same installation of database system software, the same computing resources, and the same system administration. However, each database is self-contained and fully isolated with its own database users, catalog, repository, persistence and so on.

Although database objects such as schemas, tables, views, procedures, and so on are local to the database, cross-database SELECT queries are possible. This supports in particular cross-application reporting in MCOS scenarios. For more information, see *Cross-Database Access (New)*.

For more information about the architecture of systems with multitenant database containers, see the section *Overview of SAP HANA Architecture* in the *SAP HANA Administration Guide*.

## Related Information

[SAP HANA Cross-Database Access \(New\) \[page 13\]](#)  
[SAP HANA Administration Guide](#)



## 3.2.1 SAP HANA Server Installation and Update (New)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available in the area of SAP HANA server installation to support multitenant database containers.

- An SAP HANA system can now be installed in multiple-container mode. As a result, it is capable of containing multitenant database containers, also called tenant databases. Otherwise, it is a single-container system.
- A single-container system can be migrated to a multiple-container system, but it is not possible to revert back.
- SAP HANA content is installed on tenant databases at the time of their creation. After a system upgrade, SAP HANA content on tenant databases is automatically updated from the system database.

For more information about installation, see the *SAP HANA Server Installation and Update Guide* and the *SAP HANA Administration Guide*.

### Related Information

[SAP HANA Server Installation and Update Guide](#)

[SAP HANA Administration Guide](#)

## 3.2.2 SAP HANA Cross-Database Access (New)

As of SAP HANA Platform SPS 09 (Revision 90), cross-database read queries between multitenant database containers are possible.

Every tenant database in a multiple-container system is self-contained with its own isolated set of database users and isolated database catalog. However, to support in particular cross-application reporting in MCOS scenarios (multiple components in one system), cross-database SELECT queries are possible. This means that database objects such as tables and views can be local to one database but be read by users from other databases in the same system.

So, for example, the following query would be possible:

```
SELECT *  
FROM schema1.table1 AS tab1, db2.schema2.table2 as tab2  
WHERE tab2.column2 = 'foobar'
```

The following object types on remote databases can be accessed using this mechanism:

- Schemas
- Rowstore and columnstore tables
- SQL views
- Calculation views

The following local object types can access remote database objects:

- SQL views

- Calculation views
- Procedures

A system administrator must enable cross-database access for the system and then configure which tenant databases may communicate with one another.

For more information, see *Enable and Configure Cross-Database Access* in the *SAP HANA Administration Guide*.

## Related Information

[SAP HANA Administration Guide](#)

### 3.2.3 SAP HANA Security (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available in the area of security to support SAP HANA multitenant database containers.

In general, all security-related features of the SAP HANA database (such as authentication, authorization, encryption, and auditing) apply in systems that support tenant databases in the same way as in systems that do not.

Some restrictions and additions apply.

## User Authentication

All user authentication mechanisms supported by SAP HANA are also supported in tenant databases. Whether a per-database configuration is possible depends on the authentication mechanism and the user client:

- User name/password authentication is database specific.
- For Kerberos-based authentication, a per-database configuration is not possible – databases users in all databases must be mapped to users in the same *Key Distribution Center*.
- For SAML-based authentication, a per-database configuration is possible for JDBC/ODBC client access. This is because different trust stores (containing different certificates) can be configured for individual databases.
- Database-specific trust stores cannot be configured for HTTP client access through SAP HANA Extended Services (SAP HANA XS). Therefore, user authentication based on SAML assertions and X.509 certificates cannot be database specific.

---

## Authorization

SAP HANA's standard authorization mechanisms apply to users managed directly in the tenant database with the following additions:

- The new system privilege DATABASE ADMIN exists to allow system administrators to perform certain tasks on tenant databases (for example, stop a tenant database or back up a tenant database).  
For more information, see *System Privileges (Reference)* in the *SAP HANA Security Guide*.
- A new cross-database authorization mechanism exists to support read-only queries between tenant databases. This is made possible through the association of a user in one tenant database with a user in another database. Cross-database access is disabled by default and must be enabled and configured by a system administrator before such user mappings can be set up.  
For more information, see *Cross-Database Authorization in Multitenant Database Containers* in the *SAP HANA Security Guide*.

## Encryption

- Secure Sockets Layer (SSL) and Transport Layer Security (TLS) can be configured separately for external communication between individual databases and JDBC/ODBC clients. Separate key store and trust stores must be available and configured for each database.  
A per-database configuration of SSL keys and certificates is not possible for communication with HTTP clients.
- Data volume encryption can be enabled for the system database and tenant databases individually.  
For more information, see *Data Volume Encryption in Multitenant Database Containers* in the *SAP HANA Administration Guide*.

## Auditing

Actions performed in every tenant database and the system database can be audited individually.

To ensure the privacy of tenant database audit trails, they are by default written to a database table that is local to the database being audited. Tenant database administrators cannot change the audit trail targets for their database. The system administrator can change the audit trail targets for tenant databases. However, this is not recommended.

If the audit trail target for tenant databases is changed to the syslog, audit entries contain a field `Database Name` so that it is possible to differentiate entries from different tenant databases.

New audit events are available to audit the following operations on tenant databases:

- Creation and dropping of tenant databases
- Stopping and starting of tenant databases
- Adding/Removal of services

---

## Additional Security Features

- Configuration change blacklist

To ensure the stability and performance of the overall system or for security reasons, it may be necessary to prevent certain system properties from being changed by tenant database administrators, for example, properties related to resource management. A configuration change blacklist (`multidb.ini`) is available for this purpose.

For more information, see *Prevent Changes to System Properties in Tenant Databases* in the *SAP HANA Administration Guide*.

- Restricted features

To maximize your control over the security of your system, it is possible to disable in tenant databases certain database features that provide direct access to the file system, the network, or other resources, for example import and export operations and backup functions.

For more information, see *Restricted Features in SAP HANA Multitenant Database Containers* in the *SAP HANA Security Guide* and *Disable Features on a Tenant Database* in the *SAP HANA Administration Guide*.

## Related Information

[SAP HANA Administration Guide](#)

[SAP HANA Security Guide](#)

### 3.2.4 SAP HANA System Administration (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available for in the area of system administration to support SAP HANA multitenant database containers.

Unlike a single-container system in which system and database are perceived as a single unit and are therefore administered as one, systems with multitenant database containers have 2 levels of administration:

- System administration

Administration tasks that apply to the system as a whole, including all of its databases, are performed in the system database. Such tasks include for example stopping the complete system and configuring system-level properties.

For more information, see *System Database* in the *SAP HANA Administration Guide*.

- Tenant database administration

Administration tasks that apply to a specific tenant database can be performed in the system database and/or the tenant database. Such tasks include for example creating, configuring, and monitoring tenant databases.

For information, see the sections *Setting Up Multitenant Database Containers* and *Monitoring SAP HANA Systems and Multitenant Database Containers* in the *SAP HANA Administration Guide*.



---

## Client Connectivity

- It is possible to connect individually to the system database and tenant databases using the SAP HANA studio, the SAP HANA cockpit, and the DBA Cockpit.
- The client interfaces JDBC and ODBC, as well as the command line tool SAP HANA HDBSQL have been extended to support database-level connectivity.  
JDBC/ODBC clients (including the SAP HANA studio) connect to databases in a multiple-container system by directly specifying the SQL port number of the database. Connections to the system database are made through the SQL port of the nameserver service (3<instance>15), while connections to tenant databases are made through the SQL port of the indexserver service (3<instance>40-3<instance>97). For more information about port numbers, see *Connections for Multitenant Database Containers* in the *SAP HANA Master guide*.
- HTTP(S) requests from Web clients to specific databases are managed by the internal SAP Web Dispatcher, which must be configured accordingly. For more information, see *Configure HTTP Access to Multitenant Database Containers* in the *SAP HANA Administration Guide*.

## Configuration of System Properties (INI Files)

- System configuration (\*.ini) files have an additional layer DATABASE to facilitate the configuration of properties for individual databases.
- It is possible to prevent the configuration of individual parameters in tenant databases by specifying them in the configuration change blacklist (multidb.ini).
- The Administration editor of the SAP HANA studio supports database-specific configuration of system properties files.

For more information, see *Configuring SAP HANA System Properties (INI Files)* and *Prevent Changes to System Properties in Tenant Databases* in the *SAP HANA Administration Guide*.

## System Views for System Monitoring

Every tenant database has its own SYS and \_SYS\_STATISTICS schemas that contain information about that database only. For system-level monitoring, additional views are available in the system database:

- M\_DATABASES  
This view is available in the SYS schema of the system database. It provides an overview of all tenant databases in the system. Only users with the system privilege DATABASE ADMIN can see the contents of this view.
- SYS\_DATABASES schema  
The views in the SYS\_DATABASES schema provide aggregated information from a sub-set of the views available in the SYS schema of all tenant databases in the system. These union views have the additional column DATABASE\_NAME to allow you to identify to which database information refers. The system views in the SYS\_DATABASES schema are accessible only from the system database. To be able to view information in these views, you need the system privilege DATABASE ADMIN.

## Availability and Scalability

- High availability and disaster recovery  
System replication is supported in systems that support multitenant database containers, but it can be configured only for the system as a whole. For more information, see SAP Note 2092411.
- Backup and recovery
  - Multitenant database containers follow the usual SAP HANA backup and recovery principles.
  - From the system database, system administrators can initiate backups of both the system database and individual tenant databases. Tenant database administrators can back up their own databases, as long as the backup feature has not been disabled for tenant databases.
  - The system database and tenant databases have their own backup catalogs.
  - Only system administrators can initiate recoveries from the system database.

For more information, see *SAP HANA Database Backup and Recovery* in the *SAP HANA Administration Guide*.

## Related Information

[SAP HANA SQL Command Network Protocol \(New\) \[page 39\]](#)

[SAP Note 2092793](#) 

[SAP HANA Administration Guide](#)

[SAP HANA Master Guide](#)

## 3.2.5 SAP HANA SQL (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed SQL statements and SQL syntax are available to support SAP HANA multitenant database containers.

### New Statements

The following new **data definition** statements are available:

- CREATE DATABASE **<database\_name>**  
Creates a tenant database
- DROP DATABASE **<database\_name>**  
Drops a tenant database

The following new **system management** statements are available:

- ALTER DATABASE **<database\_name>** ADD **<service>**  
Adds a service to a tenant database
- ALTER DATABASE **<database\_name>** REMOVE **<service>**  
Removes a service from a tenant database

- ALTER SYSTEM START DATABASE `<database_name>`  
Starts a tenant database
- ALTER SYSTEM STOP DATABASE `<database_name>`  
Stops a tenant database

For more information about the above statements, see *Setting Up Multitenant Database Containers* in the *SAP HANA Administration Guide*.

## Changed Statements

The following **access control** statements have been changed:

- CREATE [RESTRICTED] USER  
The option WITH REMOTE IDENTITY `<user_name>` AT DATABASE `<database_name>` has been added to allow the mapping of a new user in the local tenant database to a user in another tenant database for cross-database authorization.
- ALTER [RESTRICTED] USER  
The options ADD | DROP REMOTE IDENTITY `<user_name>` AT DATABASE `<database_name>` have been added to allow the mapping of an existing user in the local tenant database to a user in another tenant database for cross-database authorization.

For more information about the extensions to the CREATE | ALTER USER statements, see *Cross-Database Authorization in Multitenant Database Containers* in the *SAP HANA Security Guide*.

The following **system management** statements have been changed:

- BACKUP DATA  
The option FOR `<database_name>` has been added to allow the backup of individual tenant databases.
- BACKUP CATALOG DELETE  
The option FOR `<database_name>` has been added to allow the deletion of backups from the backup catalog of tenant databases.
- BACKUP CHECK  
The option FOR `<database_name>` has been added to allow checking of whether enough space is available in the file system for the database backup.
- BACKUP CANCEL  
The option FOR `<database_name>` has been added to allow canceling of a running data backup in a tenant database.
- BACKUP LIST DATA  
The option FOR `<database_name>` has been added to allow the listing of data backups for a tenant database.
- BACKUP CHECK ACCESS  
The option FOR `<database_name>` has been added to allow for checking of the availability and accessibility of tenant database backups.
- RECOVER DATA  
The options FOR `<database_name>` has been added to allow the recovery of tenant databases.
- RECOVER DATABASE  
The options FOR `<database_name>` has been added to allow the recovery of tenant databases to a specific point in time.

---

For more information about the above changed statements, see *SAP HANA Database Backup and Recovery* in the *SAP HANA Administration Guide*.

## SQL Syntax Changes

The `database_name` clause has been introduced as a prefix for object names. This means that table names can now contain 3 parts (`<database_name>.<schema_name>.<table_name>`), and column names can contain 4 parts (`<database_name>.<schema_name>.<table_name>.<column_name>`).

This extension supports cross-database queries, for example, `SELECT * FROM DB2 . SCHEMA2 . TABLE2 .`

## Related Information

[SAP HANA Security Guide](#)

[SAP HANA Administration Guide](#)

## 3.2.6 SAP HANA System Views (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed system views are available to support SAP HANA multitenant database containers.

### New System Views

- **M\_CUSTOMIZABLE\_FUNCTIONALITIES (SYS)**  
Contains information about the enablement status of restricted features in databases.  
The full content of this view is only accessible from the system database.
- **M\_DATABASES (SYS)**  
Contains information about all databases in the system  
The full content of this view is only accessible from the system database.
- **REMOTE\_USERS (SYS)**  
Contains information about user mappings for cross-database access
- **SYS\_DATABASES schema**  
Contains views that provide aggregated information from a sub-set of the system views available in the SYS schema of all tenant databases in the system  
The content of the views in this schema is only accessible from the system database

For more information about the above views, see *Setting Up Multitenant Database Containers* in the *SAP HANA Administration Guide*.



---

## Changed System Views

- **EXPLAIN\_PLAN\_TABLE (SYS)**  
Contains a new column (DATABASE\_NAME) to identify the databases involved in cross-database query execution
- **M\_DATABASE (SYS)**  
Contains a new column (SYSTEM\_ID) to differentiate between system ID (SID) and database name
- **OBJECT\_DEPENDENCIES (SYS)**  
Contains 2 new columns (BASE\_DATABASE\_NAME and DEPENDENT\_DATABASE\_NAME) to reflect cross-database dependencies
- **USERS**  
Contains a new column (HAS\_REMOTE\_USERS) to indicate whether a user has been mapped to users in other databases

## Related Information

[SAP HANA Administration Guide](#)

## 3.3 Installation and Update

### 3.3.1 Documentation Changes

As of SAP HANA Platform SPS 09 (Revision 90), the SAP HANA server installation and update documentation has been changed and restructured.

#### SAP HANA Master Guide (New and Changed)

- The topic *SAP HANA Multitenant Database Containers* has been added.
- The SAP HANA content deployment information has been updated with more details about available content deployment options. The SAP HANA lifecycle manager is deprecated, therefore the content deployment information using SAP HANA lifecycle manager (HLM) has been removed.
- The SAP HANA sizing information has also been updated with more details about the differences between appliance and tailored data center (TDI) sizing guidelines.
- The topic *SAP HANA Platform Software Components* was changed. The concept of *SAP HANA options* has been introduced.
- The topics *Connections for SAP HANA Options* and *Connections for Multitenant Database Containers* were added. In addition, some high-level information about the external ports and connections for SAP HANA

---

Answers as well as for the SAP HANA options was included in the topic *Connections from Database Clients and Web Clients to SAP HANA*.

- The topic *On-Premise* was enhanced. References to information sources regarding *SAP HANA tailored data center integration* have been enhanced.
- The topic *Important SAP Notes* has been enhanced.

## SAP HANA Server Installation and Update Guide (Changed)

- The update information now includes updating a SAP HANA system and components from **only** the SAP HANA platform lifecycle management tools. The SAP HANA lifecycle manager is no longer supported.
- All procedures are now split based on the SAP HANA database lifecycle manager (HDBLCM) user interface - graphical user interface, command-line interface, or Web user interface.
- The chapter *Using the SAP HANA Platform LCM Tools* has been added.
- SAP HANA sizing information was removed.

## Red Hat Enterprise Linux (RHEL) 6.5 Configuration Guide for SAP HANA (Changed)

- This document is now available on SAP Help Portal.
- In topic *Appendix B – Dependencies for RHEL for SAP HANA* additional packages were added.
- The topic *Prepare the Host* has been enhanced.
- The topic *Appendix J - Installation in a Virtual Machine (VMware)* has been added.

## SAP HANA LCM Tools Reference (Deprecated)

The *SAP HANA LCM Tools Reference* is no longer published to SAP HANA Help Portal. The SAP HANA platform LCM programs described in the guide are still available, but are no longer the recommended programs to perform platform LCM tasks. As of SPS 09, the SAP HANA database lifecycle manager can perform all platform LCM tasks. The platform installation and update information can be found in the *SAP HANA Server Installation and Update Guide*, and the platform configuration information can be found in the *SAP HANA Administration Guide*.

## Related Information

[SAP HANA Master Guide](#)

[SAP HANA Server Installation and Update Guide](#)

## 3.3.2 SAP HANA Server Installation and Update (New and Changed)

As of SAP HANA SPS Platform 09 (Revision 90), the SAP HANA server installation and update documentation has been updated for the multitenant database container feature, the deprecation of the SAP HANA lifecycle manager, and the remote execution of system and component update.

- The SAP HANA lifecycle manager is no longer supported to perform SAP HANA platform lifecycle management tasks. Now, the SAP HANA database lifecycle manager (HDBLCM) is responsible for performing all platform lifecycle management tasks.
- A new Web user interface for the SAP HANA database lifecycle manager has been introduced to replace the SAP HANA lifecycle manager Web user interface. The Web user interface supports the following tasks:
  - View system information
  - Update system and components
  - Install or update additional components
  - Configure System Landscape Directory (SLD) registration
  - Configure inter-service communication
- The following platform LCM administration tasks can be performed remotely if the SAP HANA database lifecycle manager is started as the <sid>adm user:
  - Update system and components
  - Install or update additional components
  - Configure System Landscape Directory (SLD) registration
  - Configure inter-service communication
- An SAP HANA system can be installed with multitenant database container support enabled. For more information, see the *SAP HANA Multitenant Database Containers* section of this document.

### Related Information

[SAP HANA Server Installation and Update Guide](#)

[SAP HANA Multitenant Database Containers \[page 12\]](#)

## 3.3.3 SAP HANA Studio Installation (New and Changed)

As of SAP HANA SPS Platform 09 (Revision 90), Microsoft Windows 8 is a supported operating system. An SAP JVM is now delivered as a Studio (Eclipse) plugin during installation.

- Microsoft Windows 8 is now supported operating system for the SAP HANA studio.
- During the installation and die update of an SAP HANA studio an SAP JVM is delivered as a Studio (Eclipse) plugin. So no additional Java runtime needs to be installed. For more information, see the *Product Availability Matrix (PAM)* on the *SAP Service Marketplace*.
- The SAP HANA studio features, which can be selected during the installation, were enhanced.

---

## Related Information

[SAP HANA Studio Installation and Update Guide](#)

[Product Availability Matrix \(PAM\)](#) 

### 3.3.4 SAP HANA Answers (New and Changed)

As of SAP HANA SPS Platform 09 (Revision 90), the following new and changed features are available for SAP HANA Answers.


#### Search (New and Changed)


- Include SAP Notes and Knowledge Base Articles (KBAs)
- Answer and Browse tab
  - The [Answer](#) tab shows questions open across all recognized SAP communities.
  - The [Browse](#) tab shows the latest posts from all SAP HANA communities.

#### Automatic Installation (New)

SAP HANA Answers integration is automatically enabled for the SAP HANA Web Workbench.

SAP HANA Answers plugin is now bundled with the SAP HANA studio.

SAP HANA Answers is an optional component and service offered under separate terms of use and privacy statements found on the SAP HANA Answers site at <https://answers.saphana.com> . SAP HANA Answers is not part of the official SAP HANA Platform license or product.

The installer enables the SAP HANA Answers integration feature by default. Administrators can disable the SAP HANA Answers integration feature. To learn more, visit the SAP HANA Answers Installation Guide found here: <https://service.sap.com/sap/support/notes/2090744> .



## 3.4 Security

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available for security.

### 3.4.1 SAP HANA Security (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed security-related features are available.

#### User and Role Management (New)

- A new form-based editor is available in the SAP HANA Web-based Development Workbench for creating and editing repository roles.  
The recommended way of authorizing users in SAP HANA is using roles created as design-time objects in the repository. However, until now, you had to create and define repository roles as text files with the file extension `.hdbrole`. The new form-based editor provides a more convenient, user-friendly graphical user interface for creating roles. It is available in the [Editor](#) tool of the SAP HANA Web-based Development Workbench.  
The text editor is still available in the SAP HANA studio and Web-based Development Workbench.  
For more information, see *Create a Design-Time Role* in the *SAP HANA Developer Guide (For SAP HANA Web Workbench)*.
- A new Web-based user self-services tool is available.  
Users reset their password and request a new user account. Administrators can process user requests and manage blacklists and whitelists.  
For more information, see *Maintaining User Self Service Tools* in the *SAP HANA Administration Guide*.
- You can now configure the following additional user properties in the [User](#) editor of the SAP HANA studio:
  - E-mail address
  - Locale
  - The priority with which the thread scheduler handles statements executed by the user
  - The maximum memory (in GB) that can be used by a statement executed by the user (if global memory limits have been configured)It is also possible to specify custom properties.  
For more information, see *Create and Authorize a User* in the *SAP HANA Administration Guide*.
- New procedures are available that allow application developers to verify that a new user name and password are compliant before actually creating the user:
  - `IS_VALID_USER_NAME (SYS)`
  - `IS_VALID_PASSWORD (SYS)`

---

## Authentication (Changed)

- The system view `M_CONNECTIONS` now contains information about the method used to authenticate a connected user.
- The procedure for resetting the `SYSTEM` user password in an emergency has changed.  
For more information, see *Reset the SYSTEM User's Password* in the *SAP HANA Administration Guide*.

## Authorization (New)

The new system privilege `TABLE ADMIN` authorizes the following administrative operations on tables:

- Load table into memory
- Unload table from memory
- Perform the delta merge operation

## Encryption (New)

- SAP's cryptographic library `CommonCryptoLib` is now installed by default as part of SAP HANA server installation at the default location for library lookup (`/usr/sap/<SID>/SYS/global/security/lib`).
- Application developers can now use the SAP HANA XS JavaScript API `security.Store` to define a secure store for encrypted name-value pairs for their applications.  
For more information, see *Using the Server-Side JavaScript APIs* in the *SAP HANA Developer Guide (For SAP HANA Web Workbench)*.
- The mechanism used to secure internal communication between hosts in a multiple-host system has changed. Communication between hosts and communication between systems in system replication scenarios are now both mapped to the same key store for internal communication (`sapsrv_internal.pse`).  
For more information, see *Secure Internal Communication Between Hosts in Distributed Scenarios* in the *SAP HANA Security Guide*.

## Auditing (New)

- You can now specify audit trail targets for audit policies.
- New audit events are available to audit the following changes to data volume encryption configuration:
  - Switching the data volume encryption on/off
  - Creating a new encryption key
  - Re-encrypting old encrypted data with the current key

For more information, see *Audit Policies* in the *SAP HANA Security Guide*.

---

## Antivirus Software Support

Application developers can use the SAP HANA XS JavaScript API `$.security.Antivirus` to integrate an antivirus engine with their XS applications.

For more information, see *Using the Server-Side JavaScript APIs* in the *SAP HANA Developer Guide (For SAP HANA Web Workbench)*.

## Related Information

[SAP HANA Security Guide](#)

[SAP HANA Administration](#)

[SAP HANA Developer Guide \(For Web Workbench\)](#)

## 3.5 System Administration

### 3.5.1 Documentation Changes

As of SAP HANA Platform SPS 09 (Revision 90), the SAP HANA system administration information has been changed and restructured.

## Multitenant Database Containers

The *SAP HANA Administration Guide* contains a new section *Setting Up Multitenant Database Containers* describing how to create and configure multitenant database containers.

## SAP DB Control Center

- **SAP DB Control Center (New)**

There is a new guide for aggregate monitoring and management of database products and their cockpits with SAP DB Control Center.

---

## SAP HANA Platform Lifecycle Management

- All SAP HANA platform lifecycle management tasks can now **only** be performed with the SAP HANA database lifecycle manager. The SAP HANA lifecycle manager is no longer supported.
- All procedures are now split based on the SAP HANA database lifecycle manager (HDBLCM) user interface - graphical user interface, command-line interface, or Web user interface.
- The chapter *Using the SAP HANA Platform LCM Tools* has been added.
- Adding and removing additional components has moved to the *SAP HANA Server Installation and Update Guide*, and has been retermed to installing and uninstalling additional components.

## SAP HANA Application Lifecycle Management

- A section about SAP HANA application lifecycle management has been added to the *SAP HANA Administration Guide*.
- Since SAP HANA application lifecycle management has taken over the [Deploy SAP HANA Content](#) and [Update Support Package Stack](#) functions of SAP HANA platform lifecycle management, the chapter *Installing and Updating Add-On Products and Software Components* has been added to the *SAP HANA Administration Guide*. It replaces the chapter *Deploy SAP HANA Application Content from a Remote Host* that described the functions previously available in SAP HANA platform lifecycle management.

## Related Information

[SAP HANA Server Installation and Update Guide](#)  
[SAP HANA Administration Guide](#)

### 3.5.2 SAP HANA System Administration (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features for managing, monitoring, configuring, and supporting SAP HANA systems are available.

#### SAP HANA Cockpit (New)

The SAP HANA cockpit is an SAP Fiori Launchpad site that provides you with a single point-of-access to a range of Web-based applications for the administration of SAP HANA. You access the SAP HANA cockpit through a Web browser.

It is available at the following URL: `http://<host>:80<instance>/sap/hana/admin/cockpit/`

The SAP HANA cockpit is installed with SAP HANA as automated content. The applications to which it provides access are installed as separate delivery units, either as automated or non-automated content. Applications that provide core administration and monitoring features are available by default, while applications that allow you to manage SAP HANA options (for example, SAP HANA dynamic tiering option) are only available if the option has been installed.

The SAP HANA cockpit displays content as *tiles* arranged in *groups*. Tiles not only function as entry points to individual applications but also display selected app-specific data for immediate review. For example, the [Latest Alerts](#) tile shows you the number of high and medium priority alerts currently in the system. From these tiles, you can drill down into the relevant app for more detailed information and functions.

The following apps for core monitoring tasks are available in the SAP HANA cockpit:

Table 2:

App	Task
<a href="#">Database Status</a>	Monitor status and resource usage of services
<a href="#">Memory Overview</a>	Monitor current memory usage
<a href="#">Memory Allocation Statistics</a>	Analyze the memory allocation history of the components of services
<a href="#">Resource Utilization Statistics</a>	Analyze the usage history of system resources (CPU, memory, disk)
<a href="#">Alerts</a>	Monitor latest alerts and analyze occurrences of an alert over time
<a href="#">Check Configuration</a>	Configure checks, for example, change alert threshold values, switch checks on/off, and run checks out of schedule

Further apps that you can access from the SAP HANA cockpit include:

- SAP HANA Web-based Development Workbench
- SAP HANA Application Lifecycle Management
- SAP HANA XS Admin Tool

## Statistics Service (New and Changed)

- The behavior of failing checks and data collectors in the embedded statistics service has changed. The system disables a check or data collector the first time it fails to execute, for example, due to a shortage of system resources. Until now, you had to re-enable the check or collector manually. Now, it is automatically re-enabled after a specific length of time. This length of time is calculated based on the values in the following columns of the table STATISTICS\_SCHEDULE (\_SYS\_STATISTICS):
  - INTERVALLENGTH
  - SKIP\_INTERVAL\_ON\_DISABLE
 Once INTERVALLENGTH x SKIP\_INTERVAL\_ON\_DISABLE has elapsed, the check is re-enabled. The default values for all checks and collectors are such that failed checks and collectors remain disabled for 1 hour. The system determines the status of every check and collector and/or whether the time to re-enablement has elapsed every 60 seconds.
- The following new checks are available:

Table 3:

Check ID	Check Name	Check Description
72	Number of log segments	Determines the number of log segments in the log volume of each service
73	Overflow of rowstore version space	Determines the overflow ratio of the rowstore version space
74	Overflow of metadata version space	Determines the overflow ratio of the metadata version space
75	Rowstore version space skew	Determines whether the rowstore version chain is too long
76	Discrepancy between host server times	Identifies discrepancies between the server times of hosts in a scale-out system
77	Database disk usage	<p>Determines the total used disk space of the database</p> <p>All data, logs, traces and backups are considered.</p> <div> <b>i Note</b>            This check is in relation to multitenant database containers.         </div>
78	Connection between systems in system replication setup	<p>Identifies closed connections between the primary system and a secondary system</p> <p>If connections are closed, the primary system is no longer being replicated.</p>
79	Configuration consistency of systems in system replication setup	<p>Identifies configuration parameters that do not have the same value on the primary system and a secondary system</p> <p>Most configuration parameters should have the same value on both systems because the secondary system has to take over in the event of a disaster</p>

- All checks are now categorized.  
The STATISTICS\_ALERT\_INFORMATION (\_SYS\_STATISTICS) table has a new column (ALERT\_CATEGORY) that identifies the check category as follows:

Table 4:

ALERT_CATEGORY Value	Category
0	None
1	Availability
2	Memory
3	Disk
4	CPU

ALERT_CATEGORY Value	Category
5	Configuration
6	Sessions/Transactions
7	Backup
8	Diagnosis Files
9	Security

## SAP HANA Studio (New and Changed)

- The following Web-based monitoring applications are no longer available in the SAP HANA studio:
  - [Monitoring Dashboard](#)
  - [Memory Overview](#)
  - [Memory Allocation Statistics](#)
  - [Resource Utilization Statistics](#)

These applications are now solely available in the SAP HANA cockpit.

- You can access the SAP HANA cockpit from the context menu of the [Systems](#) view (► [Configuration and Monitoring](#) ► [Open SAP HANA Cockpit](#) ►).
- All statements executed in the SQL console of the SAP HANA studio are now prepared by default. This setting can be disabled in the preferences (► [SAP HANA](#) ► [Runtime](#) ► [SQL](#) ►).
- It is now possible to add the system database and tenant databases of systems that support multitenant database containers. For more information new and changed features in the area of system administration for multitenant database containers, see [SAP HANA Multitenant Database Containers](#).

## SAP HANA Platform Lifecycle Management (Changed)

- The SAP HANA lifecycle manager is no longer supported to perform SAP HANA platform lifecycle management tasks. Now, the SAP HANA database lifecycle manager (HDBLCM) is responsible for performing all platform lifecycle management tasks.
- A new Web user interface for the SAP HANA database lifecycle manager has been introduced to replace the SAP HANA lifecycle manager Web user interface. The Web user interface supports the following tasks:
  - View system information
  - Update system and components
  - Install or update additional components
  - Configure System Landscape Directory (SLD) registration
  - Configure inter-service communication
- The following platform LCM administration tasks can be performed remotely if the SAP HANA database lifecycle manager is started as the [<sid>adm](#) user:
  - Update system and components
  - Install or update additional components



- Configure System Landscape Directory (SLD) registration
- Configure inter-service communication
- SAP HANA systems and instances can now be unregistered in interactive mode in both the SAP HANA database lifecycle manager graphical user interface and command-line interface.
- It is no longer possible to configure SAP Landscape Transformation (LT) replication using an SAP HANA platform LCM tool. However, SLT replication configuration is a part of SL Toolset 1.0, and can also be configured manually. See [SAP Note 1891393](#) for more information.

## SAP HANA Application Lifecycle Management (Changed)

The SAP HANA lifecycle manager functions [Deploy SAP HANA Content](#) and [Update Support Package Stack](#) were replaced by the `install` command in the SAP HANA application lifecycle management commandline tool `hdbalm`.

For more information, see *Installing and Updating Add-on Products and Software Components* in the *SAP HANA Administration Guide*. The link to *SAP HANA Administration Guide* is in the *Related Information* section.

## SAP Web Dispatcher (Changed)

The internal Web Dispatcher of the SAP HANA system, which manages incoming HTTP(s) requests, is now a native SAP HANA service (`webdispatcher`), thus replacing the previous standalone executable `sapwebdisp_hdb`.

This brings the following changes to Web Dispatcher administration:

- You can stop, start, and monitor the Web Dispatcher service in the SAP HANA studio like other SAP HANA services (for example, on the **Landscape > Services** tab of the Administration editor).
- You can configure the Web Dispatcher in the `webdispatcher.ini` file in the SAP HANA studio ([Configuration](#) tab of the Administration editor).  
Previously, the configuration of the Web Dispatcher was stored in file `<hostname>/wdisp/sapwebdisp.pfl`.
- The main trace file for the Web Dispatcher has been renamed to follow the standard SAP HANA trace file format. It is now `webdispatcher_<host>.<port>_dev_webdisp`.  
A further database trace file (`webdispatcher_<host>.<port>.<3_digit_file_counter>.trc`) is available, which contains trace information related to the Web Dispatcher's integration into the SAP HANA integration system (start/stop, configuration changes, and so on).  
You can configure the Web Dispatcher traces by editing the `webdispatcher.ini` file directly or using the [Trace Configuration](#) tab of the Administration editor.  
For more information, see *Traces and Trace Configuration for Internal Web Dispatcher* in the *SAP HANA Administration Guide*.

In addition, the Web Dispatcher administration tool is now available as an SAP HANA application. It can be accessed at the following URL:

`http://<host>:<port>/sap/hana /xs/wdisp/admin`.

---

In particular, you can use this tool to manage SSL certificates and other personal secure environments (PSEs) used by SAP HANA. SAP's command line cryptography tool SAPGENPSE is no longer required. For more information about PSE management with the Web Dispatcher administration tool, see SAP Note 2009483.

## Related Information

[SAP HANA Multitenant Database Containers \[page 12\]](#)

[SAP HANA Administration Guide](#)

[SAP Note 2009483](#) 

### 3.5.3 SAP HANA Backup and Recovery (New)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features for backup and recovery of SAP HANA systems are available.

- 3rd party backup tools (Backint)
  - Database copy using 3rd party backup tools
  - Further improvements, for example, handling of log backups
- Remove host/service
  - Fully integrated into backup/recovery process, no need for manual steps any longer
  - UI support in SAP HANA Studio for removing services
- Functions for SAP HANA multitenant database containers
  - Backup and recovery of system database
  - Backup and recovery of tenant database
  - Backup lifecycle management of system and tenant database
- New alerts
  - Log backup taking too long
  - Storage snapshot prepared

### 3.5.4 SAP HANA High Availability and Disaster Recovery (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90) there are new and changed features for SAP HANA high availability and disaster recovery.

- Improved monitoring
  - M\_SERVICE\_REPLICATION displays the column "FULL\_SYNC"
- Data and log compression for synchronous and asynchronous SAP HANA system replication.
  - Per default switched off, but can be switched on per ini parameter (one for data and one for log).
- Optimized initialization with delta shipping
  - After sr\_register of an arbitrary system a check is made to see if a delta data shipping is possible and can be executed.

- If the snapshot of the previous (last) data shipping is still available, a delta data shipping can be done instead of full data shipping.
- HA/DR Provider
  - A Python script provides hooks that can be called in response to events during Host Auto-Failover and the system replication takeover process.

## 3.5.5 Performance Monitoring (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 80), new and changed features for monitoring and managing performance are available.

### Plan Visualizer (New and Changed)

TBD

- Overview

An Overview page with the main KPIs shows you the big picture before you start detailed performance analysis.
- Statement Statistics

The visualization of the execution plan also displays statistics for each SQL statement in an SQLScript procedure.
- Operator List

More possibilities to customize this view were added, for example change the order or visibility of columns and so on.
- Network

The Network view visualizes sequential network data transfers between different servers in a distributed landscape.
- Tables Used

The Tables Used view provides an overview of the tables that are used during the processing of an SQL statement.
- Performance Trace

The Performance Trace view displays the list of operators which have performance trace data
- Calculation Scenario Visualization

You can access the 'Visualize View' from the context menu of the Systems view to visualize the calculation scenario associated with the view.

### Memory Tracking (New)

- Statement memory limit threshold

Since SPS 08, it has been possible to specify a statement memory limit in the global.ini configuration file ([memorymanager] statement\_memory\_limit). Now, it is also possible to specify what percentage of the global memory allocation limit must be in use before the statement memory limit comes into effect.

---

This feature allows expensive statements that consume more than the allowed statement memory limit to finish successfully during periods of low load, for example, during the night.

You can set the statement memory limit threshold with the property [memorymanager] statement\_memory\_limit\_threshold.

- User statement memory limit

In addition to being able to specify a memory limit for statement execution ([memorymanager] statement\_memory\_limit), it is now possible to specify a memory limit for statements executed by specific users.

If both a general statement memory limit and a user statement memory limit are set, the user-specific one (higher or lower) takes precedence.

You can set the statement memory limit for a user in the [User](#) editor of the SAP HANA studio.

## Workload Management

- Prevent over-commitment of CPUs
  - The SAP HANA administrator will be able to define a concurrency limit (maximum number of parallel threads) in the database.
  - The SAP HANA administrator will be able to limit the used cores per database.

## Related Information

[SAP HANA Administration Guide](#)

[SAP HANA Troubleshooting and Performance Analysis Guide](#)

## 3.6 Data Provisioning

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available for data provisioning.

### 3.6.1 SAP HANA Smart Data Access

The new features include the following:

- SAP MAX DB Support
- Statistics Enhancements
- Changed Default System Parameter Behavior
- Improved Join Relocation
- Function Translate Improvement
- Read-only Remote Sources and Smart Data Access Connections

## 3.6.2 SAP HANA Hadoop Integration

The new features include the following:

- Direct access to HDFS file system from SAP HANA
- Develop and invoke custom Map Reduce jobs from SAP HANA
  - SAP HANA studio as the single IDE to invoke the M/R jobs
  - Leverage HANA Repository design time for Map Reduce job, remote Hadoop source and virtual functions
  - Support of remote result caching of virtual function execution
  - A new SQL statement, CREATE VIRTUAL FUNCTION, has been added.
  - Data Provisioning support for remote source connectivity for IM in HANA via SAP HANA Service/Adapter Framework
- Support current versions of partners' (Hortonworks , Cloudera etc.) Hadoop Distributions

## 3.7 Development


As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available for development and reference guides.

### 3.7.1 Documentation Changes

As of SAP HANA Platform SPS 09 (Revision 90), the SAP HANA development documentation and references have been changed and restructured.

There have been many changes to the structure of the SAP HANA reference documentation to reflect the SAP HANA platform document set as well as the SAP HANA optional component document sets. The information included here refers to the content for the SAP HANA platform components. The SAP HANA optional component What's New documents contain information about the respective references for that component and published on its own page.

#### Caution

There are several types of licenses available for SAP HANA. Depending on the license type of your SAP HANA installation, some of the features and tools that are described in the SAP HANA platform documentation may only be available via the SAP HANA options, which may be released independently of an SAP HANA Platform Support Package Stack (SPS). Although various features included in SAP HANA options are cited in the SAP HANA platform documentation, customers who only purchased the license for the base edition of the SAP HANA platform do not have the right to use features included in SAP HANA options, because these features are not included in the license of the base edition of the SAP HANA platform. For customers to whom these license restrictions apply, the use of features included in SAP HANA options in a production system requires purchasing the corresponding software license(s) from SAP. The documentation for the SAP HANA optional components is available in SAP Help Portal at [http://help.sap.com/hana\\_options](http://help.sap.com/hana_options). For more information, see also [SAP Note 2091815 - SAP HANA Options](#)  If

you have additional questions about what your particular license provides, or wish to discuss licensing features available in SAP HANA options, please contact your SAP account team representative.

- **SAP HANA Developer Guide for SAP HANA Web Workbench (New)**  
The developer guide documentation for the SAP HANA Web Workbench is shipped as online help in the tool. We have also provided a PDF format of the document in the *SAP Help Portal*.
- **SAP HANA Modeling Guide for SAP HANA Web Workbench (New)**  
There is now a guide for modeling in SAP HANA using the SAP HANA Web Workbench.
- **SAP HANA Developer Quick Start Guide (New)**  
The quick start guide provides you with the minimal information that you require to get started developing applications in SAP HANA. This guide includes development tasks and tutorials only.

Other documentation changes in specific areas follow in this section.

## Related Information

[SAP HANA Developer Guide for SAP HANA Web Workbench](#)

[SAP HANA Modeling Guide for SAP HANA Web Workbench](#)

[SAP HANA Quick Start Guide](#)

[http://help.sap.com/hana\\_options](http://help.sap.com/hana_options)

## 3.7.2 SAP HANA Modeling (New and Changed)

As of SAP HANA platform SPS 09 (Revision 90), the SAP HANA modeling documentation has been changed and restructured.

- **Map Input Parameters and Variables in Script-based Calculation Views (Changed)**  
You can map the parameters or variables of external views for value help (external views as value help references in variables and input parameters) to the parameters or variables of script-based calculation views.
- **Provide Multiple Values for Input Parameters at Runtime (New)**  
You can create and configure input parameters in calculation views and in analytic views to support multiple values from client tools at runtime.
- **Validate Cardinality and Join Type (New)**  
You can validate the join type and cardinality of existing joins and new joins. The system analyzes the tables participating in the join and recommends an optimal join type and cardinality. This helps you avoid performance issues caused by specifying the wrong cardinality or join type information.
- **Invalidate Cached Content (New)**  
You can enable time-based cache invalidation for calculation views in their respective SAP HANA system, which then invalidates or removes data from the cache after specific time intervals.
- **Rank Nodes in Graphical Calculation Views (New)**  
You can use rank nodes, a new view node type in graphical calculation views, to partition data using a set of partition columns and to perform an order by operation on the partitioned data.
- **Add Columns to Output in Script-based Calculation Views (Changed)**

You can define the output structure of script-based calculation views with columns from information views or catalog tables that already exist in their respective SAP HANA system.

- **Package-Specific Default Schema (Changed)**

You can use the new UI in SAP HANA modeler to maintain a package-specific default schema. This replaces the manual process of using SQL statements to maintain package-specific default schema in the table `M_PACKAGE_DEFAULT_SCHEMA` (Schema: `_SYS_BI`).

- **Performance Analysis (Changed)**

You can now use the performance analysis panel in SAP HANA modeler to obtain detailed information on various joins in data foundation node. These details include, the tables participating in the join, the cardinality and join type that you choose for each join, the cardinality and join type that modeler recommends after analyzing the tables involved in the join, and the join validation status.

- **Debug Information Views (New)**

You can use the new debugger editor in SAP HANA modeler, which allows you to write and use SQL queries for debugging objects. This debugging operation helps you analyze the performance and runtime behavior of objects.

- **Refactor Modeler Objects in SAP HANA Development Perspective (New)**

You can refactor modeler objects in the SAP HANA development perspective. This means that you can now move modeler objects within or across projects in same repository workspace without changing the behavior of the modeler objects.

- **Replace View Nodes or Data Source (New)**

In calculation views you can replace view nodes, either with other underlying view nodes or with available data sources in the catalog object, without losing the semantic information of the changed node. Similarly, you can replace a data source in a column view with another available data sources in the catalog object.

- **Use Table Functions as Data Source (New)**

You can save both existing and new script-based calculations views as table functions, and you can use these table functions as a data source in their graphical calculation views.

- **Enable Information Views for Time Travel Queries (New)**

You can enable your information views to support time travel queries, which help you query the past state of data. You can use input parameters to specify the timestamp in time travel queries.

- **Support for Creating Spatial Joins (New)**

You can create spatial joins to query data from database tables that contain spatial data.

- **Enhancements to Restricted Columns (Changed)**

- Input parameters supported for restricted columns.
- BT (between) operator supported for applying restrictions on attribute columns.
- Filter expressions supported for applying restriction on base measures.

- **Copy Semantic Definitions (New)**

You can copy the semantic definition of underlying view nodes, while you are defining the semantics for a calculation view.

- **Easy access to frequently performed tasks (New)**

A Quick View pane, which is available as soon as you launch your SAP HANA studio, replaces the existing Quick Launch section and allows you to navigate quickly and perform modeling tasks such as Validate, Activate, Schema Mapping, and so on.

- **Configure Tracing**

You can configure tracing support for SAP HANA modeler to generate trace files, which you can use to report any modeling related issues to SAP support team.

- **SAP HANA Modeling Guide for SAP HANA Web Workbench (New)**

There is now a guide for modeling in SAP HANA using the SAP HANA Web Workbench.



## Related Information

[SAP HANA Modeling Guide for SAP HANA Studio](#)

[SAP HANA Modeling Guide for SAP HANA Web Workbench](#)

### 3.7.3 SAP HANA SQL Command Network Protocol (New)

As of SAP HANA Platform SPS 09 (Revision 90), additions to the SAP HANA SQL command network protocol are available.

The following network protocol areas have been updated to support SAP HANA multiple-containers:

- Message Type
- Part Kind
- Part Data Format - DBCONNECTINFO

The CONNECTOPTIONS part data format has also been updated.

For more information, see the *SAP HANA SQL Command Network Protocol Reference*.

### 3.7.4 SAP HANA Extended Application Services (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available in the SAP HANA Extended Application Services (XS).

In addition to providing application-specific consumption models, SAP HANA XS also hosts system services that are part of the SAP HANA database, for example: search services and a built-in Web server that provides access to static content stored in the SAP HANA repository. SAP HANA XS includes the following updates and additions:

#### SAP HANA Web-based Development Workbench: URLs and Roles (Changed)

The SAP HANA Web-based Development Workbench URL (`http://<WebServerHost>:80<SAPHANAinstance>/sap/hana/xs/ide`) has been replaced with `http://<WebServerHost>:80<SAPHANAinstance>/sap/hana/ide`. The individual tools have the following URLs: `/sap/hana/ide/editor`, `/sap/hana/ide/catalog`, `/sap/hana/ide/security`, and `/sap/hana/ide/trace`. Note that the old URLs redirect automatically to the new ones.

The parent role `sap.hana.xs.ide.roles::Developer` has been replaced with `sap.hana.ide.roles::Developer`. The individual roles are named as follows: `sap.hana.ide.roles::EditorDeveloper`, `sap.hana.ide.roles::CatalogDeveloper`, `sap.hana.ide.roles::SecurityAdmin`, and `sap.hana.ide.roles::TraceViewer`. The old roles now contain the new roles and are therefore still valid.

## SAP HANA Web-based Development Workbench: Editor (New and Changed)

- Additional templates and code snippets  
A complete Fiori example application is now available, as well as code snippets for XSJS, XSODATA, HDBPROCEDURE, and others.
- Automatic syntax highlighting and code completion  
The XS OData and HDB procedure editors automatically highlight the source syntax and provide code completion options and checks for syntax errors. A data preview is provided by the CDS/HDBDD editor.
- OData Application Explorer  
This tool allows you to test a backend XS OData service and ensure that it functions correctly.
- Application preview  
The application preview supports HTML page testing with various form factors.
- Immediate feedback  
This feature tracks functions called in the explored function and allows them to be included in the debugging session. The execution time for SQL queries is measured to provide feedback on possible performance issues.
- Function flow  
The function flow now covers more JavaScript language features and provides resizable, sortable, and collapsible panels, a navigation history (function graph) and alphabetical sorting (function list). Code navigation supports navigation between files for both client-side and server-side JavaScript.
- Unit testing  
SAP HANA Web-based Development Workbench provides integrated support for the XSUnit testing framework (prerequisite: you have installed the HANA Test Tools Delivery Unit). You can run XSUnit files with the file name patterns `*Test.xsjslib` and `*.xsunit.xsjslib` and view the test execution results in a panel on the right, which also allows you to navigate to the relevant code line. The tests are re-run on saving a file to provide immediate test feedback.
- Roles
  - A new form-based editor provides a convenient, user-friendly graphical user interface for creating and editing roles as design-time objects in the repository.
  - A file access check allows you to check if a particular role is functioning as designed, that is, whether the files of the application where the role is defined are accessible. You require the [sap.hana.ide.roles::SecurityTester](#) role to execute this function.
- Calculation views and analytic privileges  
You can now create graphical or script-based calculation views and analytic privileges:
  - Graphical calculation views allow you work with three calculation view node operations (join, projection, and aggregation), create and manage input parameters, variables, parameter mappings, calculated columns, counters, restricted columns, filter expressions, as applicable for each of the supported calculation view node operations, and define additional semantics for output columns.
  - Script-based calculation views allow you to write SQL script, define the script output columns and additional semantics for output columns, and create and manage input parameters, variables, and parameter mappings.
  - For analytic privileges, you can select secured models and manage attribute restrictions, as well as maintain privilege validities.
- Context-sensitive help  
The [Help](#) menu option provides help based on the artifact type.

---

## **SAP HANA Web-based Development Workbench: Catalog (New and Changed)**

- New features in the catalog browser include import and export of catalog objects, filtering on the catalog tree, searching on table columns and comments, and deletion of multiple objects.
- The catalog editor allows you to generate statements to invoke procedures or functions in the SQL console. The SQL editor provides code completion, allows you to download SQL extension files, and displays results with additional options, such as copying rows or cells, changing layouts, and exporting data as csv files.
- Favorites let you to save your frequently used objects for easier access.
- A SQLScript debugger enables you to set breakpoints in the runtime object and call the procedure from the SQL console.
- The where-used list now changes according to the objects of the selected tab and can be pinned.
- SQL performance measurement (database layer, XS layer, and frontend layer) allows you to inspect the performance of a query execution.

## **SAP HANA Web-based Development Workbench: Security (New)**

- New features in the security browser include filtering on the security tree, deletion of multiple users and roles, and shortcut links for quicker access to objects.
- User parameters can be stored in the user editor.
- Password policy, audit policy, and SAML identity providers are now supported.

## **SAP HANA Web-based Development Workbench: Trace (New)**

- New features in the trace browser include filtering on the trace files tree, deletion of single and multiple trace files, compressing and downloading trace files, and shortcut links for quicker access to trace files.
- Search file content allows you to search for specific content in multiple files and also supports keyword highlighting in trace content.
- The expensive statement trace allows you to assess the database performance of your application.

## **XS Project Set up and Artifact Generation (New and Changed)**

- You can now generate project artifacts, which are automatically activated for you, using the Create New XS Project wizard.
- The Create HDB Procedure wizard was enhanced. You can now include a schema in the procedure.

---

## XS Administration (New)

- You can now navigate from a folder or file to the new XS Administration view.

## XS JavaScript Debugging (New)

There are now four debug configuration types available to trigger the debugging of XS JavaScript files:

- XS JavaScript: Use to debug an XS JavaScript standalone service.
- XS JavaScript: Manual Session: Use to debug an XS JavaScript called from any remote client using that specific XS session.
- XS JavaScript: HTML-based: Use to debug an XS JavaScript called from HTML.
- XS JavaScript: XS OData-based: Use to debug an XS JavaScript called from an XS OData breakout.

## Artifact Editors (Changed)

- **SQLScript Editor**  
The SQLScript editor includes semantic code completion, a context based code completion that lists suggested catalog objects and local variables while creating and editing stored procedures and functions. A mandatory select target schema field has been added to the New Procedure dialog box.
- **SQLScript Debugger**  
Stored procedures nested calls now appear in the call stack, enabling you to view the nested calls while debugging stored procedures.

## Repository Browser Editing (New)

You can now edit all objects by selecting them in the Repository browser without having to check them out or having them assigned to a project. Additionally you can create a new package, import an existing workspace, and remove workspaces created by other users in the Repository browser.

## Refactoring Services (New)

You can move objects to another package using the Move feature. In addition to searching for all affected objects before the move, the feature allows you to adjust the package reference in the source and affected objects.

---

## HDBDD Creation Template (Changed)

The HDBDD creation templates now support multiple creation scenarios.

## Web Bridge

You can use the Web Bridge to run the SAP HANA Web-based Development Workbench editors in the SAP HANA studio.

## Related Information

[SAP HANA Developer Guide for SAP HANA Studio](#)

[SAP HANA Developer Guide for SAP HANA Web Workbench](#)

[SAP HANA Developer Guide for SAP HANA Studio](#)

## 3.7.5 SAP HANA UI Integration Services (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available for SAP HANA UI Integration Services.

### New Features

- Role-based access to content of SAP Fiori launchpad sites.  
To enable user access to site content, users and site content are assigned to predefined roles.
- New tile templates:
  - Custom App Launcher tile, which can display a custom SAPUI5 view
  - News tile, which can be configured to display news feeds

### Deprecated Features

Standard application sites and related features are deprecated as of SPS 09, and will not be shipped with the future releases. They are replaced by SAP Fiori launchpad sites.

## Documentation Changes

Documentation has been changed and restructured to separate the deprecated features.

## Related Information

[SAP HANA Developer Guide](#)

### 3.7.6 SAP HANA Interactive Education (SHINE) (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available in SAP HANA Interactive Education (SHINE).

The following features are included in this release of SHINE.

- **SMTP Mail Services (New)**
- **HANA XS Data Services (XSDS) (New)**
- **Full Text Search with SAPUI5 , ODATA and CDS (New)**
- **Unit Testing with SAP HANA (New)**
- **Series Data (New)**
- **Zip API Functions (New)**

#### Caution

There are several types of licenses available for SAP HANA. Depending on the license type of your SAP HANA installation, some of the features and tools that are described in the SAP HANA platform documentation may only be available via the SAP HANA options, which may be released independently of an SAP HANA Platform Support Package Stack (SPS). Although various features included in SAP HANA options are cited in the SAP HANA platform documentation, customers who only purchased the license for the base edition of the SAP HANA platform do not have the right to use features included in SAP HANA options, because these features are not included in the license of the base edition of the SAP HANA platform. For customers to whom these license restrictions apply, the use of features included in SAP HANA options in a production system requires purchasing the corresponding software license(s) from SAP. The documentation for the SAP HANA optional components is available in SAP Help Portal at [http://help.sap.com/hana\\_options](http://help.sap.com/hana_options). For more information, see also [SAP Note 2091815 - SAP HANA Options](#). If you have additional questions about what your particular license provides, or wish to discuss licensing features available in SAP HANA options, please contact your SAP account team representative.

## Related Information

[SAP HANA Interactive Education \(SHINE\)](#)

---

## 3.7.7 SAP HANA Application Function Modeler (New and Changed)

As of SAP HANA platform SPS 09 (Revision 90), new and changed features are available in the SAP HANA Application Function Modeler (AFM).

AFM, the graphical dataflow modeling and programming tool in the SAP HANA studio has been enhanced as follows.

- It supports multi-step application function flows. (New)
- You can create a transportable flowgraph design-time model that is stored in the SAP Hana repository. (New)
- In addition to the Predictive Analysis Library (PAL) and the Business Function Library (BFL), AFM now integrates with custom Application Function Libraries (AFLs) and R. (New)
- Data flows can be executed with SQLScript (as column views or stored procedures) and Task Generation (New)

### Related Information

[SAP HANA Developer Guide for SAP HANA Studio](#)

## 3.7.8 SAP HANA Application Lifecycle Management (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new and changed features are available in SAP HANA application lifecycle management.

### General (New and Changed)

- Terminology:
  - *Changes* have been renamed to *changelists*. (changed)
  - *Transport type* has been renamed to *transport mode*. (changed)
  - The transport type *Full DU* has been renamed to transport mode *Complete DU*, *Full Released* has been renamed to *All Changelists*, and *Changes* has been renamed to *Selected Changelists*. (changed)
- SAP HANA CTS transport and export of delivery units: You can now specify an export file format if you want to import the files into older SAP HANA server versions. (new)
- For CTS transport, the existence of an AS JAVA to host the Deploy Web Service is no longer required. (new)

For more information on further requirements, see the guide *How To Configure SAP HANA for CTS* for SAP HANA SP 09. The link to the guide is in the *Related Information* section.



---

## SAP HANA Application Lifecycle Management (XS application) (Changed)

- The *Upload/Download* tab has been moved to *Export* and *Import* of delivery units in the *Delivery Unit* tab in the *PRODUCTS* section.
- The dialog box for creating and editing transport routes has been enhanced. For transports of delivery units, the transport mode is always *Complete Delivery Units* for the selected delivery units or product instance. If change recording is enabled, you can choose between transporting *All Changelists* and *Selected Changelists*.
- Various other improvements to the user interface of SAP HANA application lifecycle management.

## Commandline tool hdbalm (New and Changed)

- Assembly of SAP HANA developments into installable products and software components for customers and partners (new)
- Install and Update of SAP HANA add-on products and software components now to be used instead of HLM functions (changed)
- hdbalm functions and online documentation revised and updated (changed)

## Related Information

[SAP HANA Developer Guide for SAP HANA Studio](#)

[SAP HANA Developer Guide for SAP HANA Web Workbench](#)

[How To Configure SAP HANA for CTS](#) 

## 3.7.9 SAP HANA Series Data (New)

As of SAP HANA Platform SPS 09 (Revision 90), new features are available in SAP HANA Series Data.

Time series is used to understand the behavior of data over time. New aggregate functions, window functions, and table functions have been added to support common operations such as detecting trends, making predictions based on the past, and finding and correcting anomalies in the data. In the common case that the time intervals are equidistant, a new storage layout offers much better compression for the series data.

New aggregate functions, window functions, and table views have been added to support Series Data.

## Related Information

[SAP HANA Series Data Developer Guide \(PDF\)](#)

---

## 3.7.10 SAP HANA SQLScript (New)

As of SAP HANA Platform SPS 09 (Revision 90), new features are available in the SAP HANA SQLScript.

The following features have been added to SQL Script.

- **Implicit Table Type for Table Parameters** (New)
- **Explicit Table Type Definition** (New)
- **Autonomous Transaction** (New)

### Related Information

[SAP HANA SQLScript Reference](#)

## 3.7.11 SAP HANA SQL Syntax (New and Changed)

As of SAP HANA Platform SPS 09 (Revision 90), new features and changes are available in the SAP HANA SQL syntax.

The following SQL functions and statements are now available in the SAP Note 2094186. See the link in *Related Information*.

- BITOR (New)
- BITXOR (New)
- BITNOT (New)
- BITCOUNT (New)
- REPLACE\_REGEXPR (New)
- LOCATE\_REGEXPR (New)
- SUBSTRING\_REGEXPR (New)
- LIKE\_REGEXPR (New)
- OCCURENCES\_REGEXPR (New)
- Window functions now also support PERCENTILE\_CONT, PERCENTILE\_DISC and ROWS (Changed)
- CREATE TRIGGER now also supports CALL (Changed)

### Related Information

[SAP Note 2094186](#) 

---

## 4 SAP HANA Platform SPS 08, Features Included in Revision 82

### 4.1 Development

As of SAP HANA Platform SPS 08 (Revision 82), new and changed features are available for development.

#### 4.1.1 SAP HANA Interactive Education (SHINE) (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 82), new and changed features are available in the SAP HANA Interactive Education (SHINE).

##### Note

Use SHINE only in your test environment.

SHINE offers several new features and enhancements to optimize its usability. These features and enhancements include the following:

- Enhanced navigation help (Changed)
- Disabling time-based data generation when normal data generation is selected and vice versa (Changed)
- Rechecking SHINE contents to identify unused entities (New)
- Central formatting functions to display amounts uniformly across all SHINE scenarios (New)
- Data generation feature that allows you to generate only sales orders or purchase orders (New)

---

## 5 SAP HANA Platform SPS 08, Features Included in Revision 80

As of SAP HANA Platform SPS 08 (Revision 80), new features and enhancements are provided for installation, security, administration, data provisioning and development.

Some of the SAP HANA Platform SPS 08 (Revision 80) feature highlights are:

- RedHat Enterprise Linux (RHEL) as supported operating system
- Enhanced SAP HANA studio usability and productivity
- Security enhancements for user/role management and auditing
- Improved system administration (for example, monitoring dashboard) and lifecycle management
- SAP HANA Spatial innovations and ESRI support
- SAP HANA Smart Data Access support for IBM
- SAS integration
- New algorithms for SAP HANA Predictive Analysis Library
- Several SAP HANA XS (Extended Application Services) and SAP HANA Web IDE enhancements
- SAP HANA Interactive (SHINE) improvements
- Microsoft ADO.Net client connectivity

### 5.1 Installation and Update

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available for installation and update.

#### 5.1.1 Documentation Changes

As of SAP HANA Platform SPS 08 (Revision 80), the SAP HANA server, client, and studio installation and update documentation, as well as the SAP HANA Master Guide have been changed or restructured.

##### SAP HANA Master Guide (Changed)

- The chapters have been reorganized and renamed, and now include the following:
  - Getting Started with SAP HANA - Introduction to the SAP HANA
  - SAP HANA Use Cases - Example scenarios of how SAP HANA is used in the real world
  - SAP HANA Architecture - Example hardware and software configurations of SAP HANA systems
  - SAP HANA Deployment Options - On-premise and in the cloud deployment options

- SAP HANA Implementation and Operation - Introduction to SAP HANA sizing, installation, administration, and content
- The document scope has been widened to include system landscape information.
- The information about SAP HANA content had been extended to include delivery units containing catalog objects.

## SAP HANA Server Installation and Update Guide (Changed)

- The update information now includes updating a SAP HANA system and components from both the SAP HANA lifecycle management tool hdblcm(gui) and the SAP HANA lifecycle manager. Previously, the SAP HANA lifecycle manager update was described in the *SAP HANA Update and Configuration Guide*. As of SPS 08, the *SAP HANA Update and Configuration Guide* is no longer available.
- The document title has been changed from *SAP HANA Server Installation Guide* to *SAP HANA Server Installation and Update Guide*. The URL to the PDF document on SAP Help Portal remains the same.

## SAP HANA Client Installation and Update Guide (Changed)

- The document title has been changed from *SAP HANA Database - Client Installation and Update Guide* to *SAP HANA Client Installation and Update Guide*. The URL to the PDF document on SAP Help Portal remains the same.
- The SAP HANA client installation information has been restructured based on the supported operating system type (either UNIX/Linux or Windows).

## SAP HANA Studio Installation and Update Guide (Changed)

- The SAP HANA studio installation and update information has been restructured based on the supported operating system type (either Linux or Windows). The guide starts with a general section valid for installation or update on either operating system, and follows with SAP HANA studio on Linux, then SAP HANA studio on Windows. Call options valid for both operating systems are described in the general section, while operating system-dependent commands are listed in their individual sections.
- The document title has been changed from *SAP HANA Database - Studio Installation and Update Guide* to *SAP HANA Studio Installation and Update Guide*. The URL to the PDF document on SAP Help Portal remains the same.

## Related Information

[SAP HANA Master Guide](#)

[SAP HANA Server Installation and Update Guide](#)

[SAP HANA Client Installation and Update Guide](#)

## 5.1.2 SAP HANA Server Installation and Update (New and Changed)

As of SAP HANA SPS Platform 08 (Revision 80), RedHat Enterprise Linux (RHEL) is a supported operating system and new parameters are available for installation and update using the SAP HANA lifecycle management tools hdblcmm and hdblcmmgui.

- RedHat Enterprise Linux (RHEL) is now a supported operating system for the SAP HANA server. For more information, see SAP Note 2009879 in Related Information.
- The following server installation and update parameters are now available:
  - `install_ssh_key` - Installs an SSH key for remote host access
  - `max_mem` - Specifies the maximum memory allocation for a new system
  - `restrict_max_mem` - Specifies whether maximum memory allocation is restricted for a new system
  - `scope` - Specifies system or local instance to be marked for update
  - `system_usage` - Specifies the usage type of the system to be installed

### Related Information

[SAP Note 2009879](#) 

[SAP HANA Server Installation and Update Guide](#)

## 5.1.3 SAP HANA Studio Installation (New and Changed)

As of SAP HANA SPS Platform 08 (Revision 80), RedHat Enterprise Linux (RHEL) is a supported operating system, role-based SAP HANA studio installation is available, and the recommended update site configuration tool has been changed.

- RedHat Enterprise Linux (RHEL) is now a supported operating system for the SAP HANA studio. For more information, see SAP Note 2009879 in Related Information.
- It is now possible to configure role-based SAP HANA studio features by specifying the call option `--features=<role>` during installation. Role-based feature sets include: SAP HANA studio administration, SAP HANA studio database development, and SAP HANA studio application development.
- In previous releases, it was advised to use the SAP HANA lifecycle manager to configure the update site for SAP HANA studio update. Now, the SAP HANA lifecycle management tool hdblcmm(gui) is the recommended tool to manually set up the update site for an SAP HANA studio update.
- SAP HANA Answers is a knowledge hub for SAP HANA that can be integrated with SAP HANA studio. When installed it provides a new view in SAP HANA studio allowing you to find answers to questions based on your context or ask questions to the community.

#### Note

SAP HANA Answers is an optional, additional offering from SAP and is not part of the official SAP HANA Platform license or product.

## Related Information

[SAP Note 2009879](#) 

[SAP HANA Studio Installation and Update Guide](#)

## 5.1.4 SAP HANA Client Installation (New)

As of SAP HANA SPS Platform 08 (Revision 80), Windows 2012 R2 is a supported operating system for the SAP HANA client, and the client interface Microsoft ADO.NET is installed as part of SAP HANA client installation.

## Related Information

[SAP HANA Client Installation and Update Guide](#)

[SAP HANA Data Provider for Microsoft ADO.NET Reference](#)



## 5.2 Security

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available for security.

### 5.2.1 Security in the SAP HANA Database (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and changed security-related features are available in the SAP HANA database.

#### User and Role Management (New and Changed)

- **Restricted database users**  
User administrators can now create restricted database users, that is, users who initially do not have any privileges. Restricted users are intended for provisioning users who access SAP HANA through client applications (ODBC, JDBC, or HTTP). If the privileges required to use the application are encapsulated within an application-specific role, then it is necessary to grant the user only this role. In this way, it can be ensured that users have only those privileges that are essential to their work.  
To allow restricted users to connect to the database via the ODBC or JDBC interface, the following new standard roles are available and must be granted:
  - RESTRICTED\_USER\_ODBC\_ACCESS
  - RESTRICTED\_USER\_JDBC\_ACCESSFor more information, see *User Types* in the *SAP HANA Security Guide*.
- **Enhancements to standard role SAP\_HANA\_INTERNAL\_SUPPORT**
  - A new parameter `max_internal_support_user_count` in the authorization section of the `indexserver.ini` configuration file allows you to configure the maximum number of users who can simultaneously be granted the SAP\_HANA\_INTERNAL\_SUPPORT role. The default value is 1.
  - A new check (63) monitors whether the SAP\_HANA\_INTERNAL\_SUPPORT role is granted to any user in the database and issues an alert if it is.For more information, see *Standard Roles* in the *SAP HANA Security Guide*.
- **Extended character set support for user names**  
Database user names can now contain 1-, 2-, and 3-byte CESU-8 characters. 4-byte CESU-8 characters are not supported. ASCII 7-bit characters a-z, A-Z, 0-9, &, #, \$, and \_ are supported. Only # and \$ cannot be used as the first character. This means that user names can now start with numbers.

#### **i** Note

1-byte CESU-8 characters are 1-byte characters that do not belong to the ASCII 7-bit character set.

---

## Authentication (Changed)

A new check (62) monitors when database user passwords are due to expire in line with the password policy and issues a medium priority alert. This may be useful for technical database users since password expiration results in the user being locked, which may affect application availability. It is recommended that you disable the password lifetime check of technical users so that their password never expires.

## SSL Configuration for External Communication (Changed)

A new parameter `sslCipherSuites` in the communication section of the `global.ini` configuration file allows you to change the default algorithms used by the configured cryptographic library to secure client-to-server communication.

For more information, see *Server-Side SSL Configuration Properties for External Communication* in the *SAP HANA Security Guide*.

## Auditing (Changed)

- Multiple audit trail targets  
It is now possible to configure different audit trail targets for the same system depending on the severity of the action being audited. Different audit trail targets can be configured at the following levels:
  - System
  - Audit levels EMERGENCY, CRITICAL, and ALERT  
Several audit trail targets are configurable for each audit level.If no specific audit trail target is configured for an audit level, the target configured for the system applies.
- Size of audit trail database table  
A new alert (64) monitors the size of the internal database table used as the target for the audit trail and issues an alert when it reaches defined values (by default 5%, 7%, and 9% of the memory allocation limit of the system).
- Audit trail enhancement  
The previous value of changed configuration parameters is now recorded in the audit trail. For the audit trail targets CSV and SYSLOG, this is the field Old Value. For the audit trail target database table, this is the column PREV\_VALUE.  
For more information, see *Audit Trails* in the *SAP HANA Security Guide*.

## Related Information

[SAP HANA Security Guide](#)

---

## 5.2.2 Security Administration (Changed)

As of SAP HANA Platform SPS 08 (Revision 80), changed features are available for security administration in the SAP HANA studio.

- SAML identity provider configuration  
The page for adding SAML identity providers is now available in the Security editor. It is no longer available in the [System Properties](#) dialog.
- Repository roles  
The runtime version of roles created in the repository of the SAP HANA database can no longer be edited in the Role editor.
- Page encryption key change  
If you have enabled data volume encryption in your system, it is now possible to create a new page encryption key in the Security editor. If necessary, you also can re-encrypt the entire data area with the new key.

For more information, see *Security Administration* in the *SAP HANA Administration Guide*.

### Related Information

[SAP HANA Administration Guide](#)

## 5.3 System Administration

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available for system administration.

### 5.3.1 Documentation Changes

As of SAP HANA Platform SPS 08 (Revision 80), the SAP HANA Administration Guide, SAP HANA Technical Operations Manual and SAP HANA Performance Analysis Guide have been changed or restructured.

- SAP HANA Performance Analysis Guide now include troubleshooting information. The guide has been renamed as: SAP HANA Troubleshooting and Performance Analysis Guide and the URL to the PDF document on SAP Help Portal has changed.
- On the Help Portal page for SAP HANA Platform, the section on SAP HANA Lifecycle Management Guides has been removed and the SAP HANA LCM Tools Reference Guide is now found under Reference Information.  
The SAP HANA Update and Configuration Guide is no longer available. Topics on post installation tasks previously found in the SAP HANA Update and Configuration guide have been moved to the SAP HANA Administration Guide.

## 5.3.2 System Administration (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features for managing, monitoring, configuring, and supporting SAP HANA systems are available.

- [Managing Systems in the SAP HANA Studio \(New and Changed\) \[page 56\]](#)
- [Monitoring Systems in the SAP HANA Administration Console \(New and Changed\) \[page 57\]](#)
- [Catalog-Related Features in the SAP HANA Studio \(New\) \[page 58\]](#)
- [Configuring an SAP HANA System and Components After Installation with SAP HANA Lifecycle Management Tools \(New and Changed\) \[page 58\]](#)
- [Diagnosis Features in the SAP HANA Administration Console \(New and Changed\) \[page 60\]](#)

### Managing Systems in the SAP HANA Studio (New and Changed)

- **Command line parameters for starting the SAP HANA studio**  
The SAP HANA studio program now accepts command line parameters that allow you to specify the system to be connected to immediately on startup. This can be useful to system administrators, as well as to other programs that call the SAP HANA studio. The following start parameters can be specified:
  - -h (host)
  - -n (instance)
  - -u (user name)



#### Example

```
c:"\Program Files\sap\hdbstudio\hdbstudio.exe" -h hanal -n 02 -u DBADMIN
```

For more information, see *Start the SAP HANA Studio with Immediate System Logon* in the *SAP HANA Administration Guide*.

- **Context menu of the *Systems* view**  
The context menu of the *Systems* view in the SAP HANA studio has been enhanced to improve usability. Now only system-specific actions are available at system level and these are grouped into logical categories such as *Configuration and Monitoring* and *Backup and Recovery*.
- **Production system warning**  
If during system installation, the new parameter `system_usage` was set to **production**, the SAP HANA studio warns users when they are about to perform potentially critical operations, for example, execute SQL statements, stop or restart the system, perform a data backup, and so on. The `global.ini` configuration file contains a new parameter `usage` in the `system_information` section that allows you to configure system usage after installation.  
For more information, see *Configure System Usage Type* in the *SAP HANA Administration Guide*.

## Monitoring Systems in the SAP HANA Administration Console (New and Changed)

- Monitoring Dashboard

A new Web-browser-based dashboard for system monitoring is available. The [Monitoring Dashboard](#) visualizes key aspects of system health and configuration on a single screen with the option to drill down to more detailed views. You can access the Monitoring Dashboard from the context menu of the [Systems](#) view.

For more information, see *Monitoring Dashboard* in the *SAP HANA Administration Guide*.

- Memory Allocation Statistics

The Web-browser-based editor [Memory Allocation Statistics](#) has been changed to reflect improved naming of service components. Subcomponents are now grouped and displayed in a collapsible tree view. For more information, see *Analyze Memory Allocation Statistics* in the *SAP HANA Administration Guide*.

- Statistics service checks

The statistics service, the internal monitoring service of the SAP HANA database, performs the following new checks, which can be monitored on the [Alerts](#) tab of the Administration editor:

Table 5:

Check ID	Check Name	Check Description
62	Expiration of database user passwords	Identifies database users whose password is due to expire in line with the configured password policy
63	Granting of SAP_INTERNAL_HANA_SUPPORT role	Determines if the internal support role (SAP_INTERNAL_HANA_SUPPORT) is currently granted to any database users.
64	Total memory usage of table-based audit log	Determines what percentage of the effective allocation limit is being consumed by the database table used for table-based audit logging.
65	Runtime of the log backups currently running	Determines whether or not the most recent log backup terminates in the given time.
66	Storage snapshot is prepared	Determines whether or not the period during which the database is prepared for a storage snapshot exceeds a given threshold.
67	Table growth of row-store tables	Determines the growth rate of row-store tables
68	Total memory usage of row store	Determines the current memory size of a row store used by a service
69	Enablement of automatic log backup	Determines whether automatic log backup is enabled.
70	Inconsistencies in schemas	Identifies schema inconsistencies
71	Row-store fragmentation	Identifies row-store fragmentation

- Connection status of canceled sessions

It is possible to cancel sessions on the [Performance > Sessions](#) tab of the Administration editor. The [Connection Status](#) column now shows more detailed status information once the cancellation of a session has been requested. The following statuses are possible:

- IDLE (CANCEL REQUESTED)

The connection is idle, a cancellation has been requested, but the connection is not yet canceling.

- RUNNING (CANCEL REQUESTED)

The connection is working on a request, a cancellation has been requested, but the connection is not yet canceling (meaning not in rollback yet)

- RUNNING (CANCELING)

The connection is working on a request, a cancellation has been requested, and the connection is already canceling (meaning already in rollback)

This connection status information is retrieved from the CONNECTION\_STATUS column of the M\_CONNECTIONS system view.

- Classification of low-level locks

For the analysis of blocked threads, information about low-level locks is available on the [Performance Threads](#) tab. Low-level locks manage code-level access to a range of resources (for example, internal data structures, network, disk). The lock wait components group low-level locks by engine component or resource. The following more detailed classification is now available in the [Lock Wait Component](#) column:

- Network IO
- File IO
- Basis System
- Calculation Engine
- Join Engine

This information about lock wait component is retrieved from the LOCK\_WAIT\_COMPONENT column of the M\_SERVICE\_THREADS and M\_SERVICE\_THREAD\_SAMPLES system views.

- User-defined statements for system monitoring

On the [System Information](#) tab of the Administration editor, you can save your own SQL statements for monitoring purposes. It is now possible to organize statements into folders, as well as to import statements as text or ZIP archive files from a location on your local computer or network file server. For more information, see *Use User-Defined SQL Statements for System Monitoring* in the *SAP HANA Administration Guide*.

## Catalog-Related Features in the SAP HANA Studio (New)

- Shapefile import

SAP HANA supports the Environmental System Research Institute, Inc. (ESRI) shapefile format. You can now import shapefiles into SAP HANA column-store tables using the import feature of the SAP HANA studio.

For more information, see *Import ESRI Shapefiles* in the *SAP HANA Administration Guide*.

- Planning engine support

EPM models and EPM query sources are now visible in the [Catalog](#) folder of the [Systems](#) view.





















## Configuring an SAP HANA System and Components After Installation with SAP HANA Lifecycle Management Tools (New and Changed)

The SAP HANA lifecycle management tools hdblcm(gui) and lifecycle manager can be used to configure an SAP HANA system after installation. The lifecycle manager is used to perform the tasks remotely, while hdblcm(gui) is used to perform the tasks locally.

As of SPS 08, the lifecycle manager has reduced functionality, with many of its formerly supported tasks now performed by hdblcmm(gui).

The following table shows SPS 08 functionality for hdblcmm(gui) and the lifecycle manager.

Table 6:

	hdblcmm(gui)	lifecycle manager
SAP HANA server, studio, and client installation		
SAP HANA server, studio, and client update		
System rename (host names, SID, instance number)		
Host addition and removal		
Inter-service communication configuration		
SLD registration configuration		
SLT replication configuration		
System reconfiguration (relocate, clone, copy)		
Additional component installation and update (AFL, LCApps, SDA)		
Application content deployment		

Changes have been made to the SAP HANA lifecycle management configuration tasks:

- **SAP HANA host addition and removal**
  - It is now possible to add or remove more than one host at a time from a host that is either already integrated in the SAP HANA system or non-integrated.
  - These tasks were formerly available in the lifecycle manager. Now they must be performed with hdblcmm(gui).
  - The documentation for this task has been moved to the *SAP HANA Administration Guide*.
- **SAP Landscape Transformation (SLT) replication configuration**
  - The documentation for this task has been moved to the *SAP HANA Administration Guide*.
- **System Landscape Directory (SLD) registration configuration**
  - It is now possible to perform this task using an additional tool - hdblcmm(gui).
  - The documentation for this task has been moved to the *SAP HANA Administration Guide*.
- **Inter-service communication configuration**
  - This task was formerly called "SAP HANA system internal network configuration". It has been renamed.
  - This task was formerly available in the lifecycle manager. Now it must be performed with hdblcmm(gui).
  - The documentation for this task has been moved to the *SAP HANA Administration Guide*.
- **Solution Manager Diagnostics Agent addition**
  - This task was formerly available in the lifecycle manager. Now it must be performed with Software Provisioning Manager (SWPM).
  - The documentation for this task can be found in SAP Note 1858920.
- **System rename (including host names, SID, and instance number)**

- After system rename, a temporary license is produced. The system is no longer frozen immediately after rename.
- This task was formerly available in the lifecycle manager. Now it must be performed with `hdblcm(gui)`.
- The documentation for this task has been moved to the *SAP HANA Administration Guide*.
- **System component addition**
  - Component change - The SAP HANA lifecycle management tools support adding product-specific AFLs to an existing SAP HANA system.
  - It is now possible to perform this task using an additional tool - `hdblcm(gui)`.
  - The documentation for this task has been moved to the *SAP HANA Administration Guide*.
- **System reconfiguration**
  - New - For SAP HANA systems that need to be reconfigured, due to hardware changes or upgrades, it is possible to relocate, copy, or clone the SAP HANA system by simply unregistering and re-registering the system.

For more information see, *Configuring an SAP HANA System and Components After Installation* in the *SAP HANA Administration Guide*.

## Diagnosis Features in the SAP HANA Administration Console (New and Changed)

- **Emergency information**

When an SAP HANA system cannot be reached by SQL or is experiencing performance problems, you can open the Administration editor in diagnosis mode using the connection of the SAP start service (`sapstartsrv`). A new [Emergency Information](#) tab is now available in diagnosis mode. Here you see all connections, transactions, blocked transactions, and threads in the system. If necessary, you can cancel individual connections and transactions, or even cancel all transactions. This is useful if transactional problems are the source of performance issues in an unresponsive system.

For more information, see *Troubleshooting an Inaccessible or Unresponsive SAP HANA System* in the *SAP HANA Administration Guide*.
- **Collection of diagnosis information**

The feature for collecting diagnosis information on the [Diagnosis Files](#) tab of the Administration editor has enhanced options for configuring the scope of information collected. When you trigger the collection of diagnosis information, you can now do the following:

  - Select a date and time range for information collection
  - Create and collect only runtime environment (RTE) dump files

In addition, you can specify from which index servers RTE dump files are to be collected, the number of RTE dump file sets to be collected, and the interval at which RTE dump files are to be collected. The corresponding options in the underlying Python support script `fullSystemInfoDump.py` are as follows:

  - `--toDate <YYYY-MM-DD>`
  - `--fromDate <YYYY-MM-DD>`
  - `--rtedump`
  - `--indexservers <comma-separated list of index servers>`
  - `--sets <no. of RTE dump file sets>`
  - `--interval <interval in minutes>`



---

When you trigger the collection of diagnosis information either in the SAP HANA studio or from the command line, information from the following system views is now also included:

- M\_CE\_CALCSCENARIOS WHERE SCENARIO\_NAME LIKE '%\_SYS\_PLE%'
- SYS.M\_DEV\_PLE\_SESSIONS\_
- SYS.M\_DEV\_PLE\_RUNTIME\_OBJECTS\_
- SYS.M\_DEV\_ALL\_LICENSES
- SYS.M\_EPM\_SESSIONS
- \_SYS\_EPM.VERSIONS
- \_SYS\_EPM.CONTAINERS
- \_SYS\_EPM.TEMPORARY\_CONTAINERS
- \_SYS\_EPM.CONTAINERS
- \_SYS\_EPM.SAVED\_CONTAINERS

For more information, see *Collecting Diagnosis Information for SAP Support* in the *SAP HANA Administration Guide*.

- SAP HANA studio support for Mac OS. For more information see *SAP Note 2004651*.

## Related Information

[SAP HANA Administration Guide](#)

[SAP Note 2004651](#) 

## 5.3.3 High Availability and Disaster Recovery (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), SAP HANA can be additionally configured in synchronous replication mode to deal with connection loss to the secondary site using the Full Sync option.

With SPS 08 multitier system replication can be set up with the SAP HANA studio as well as on the command line. In multitier system replication, synchronous replication can be used as the source for asynchronous replication in a chained setup of primary site, tier 2 secondary site and tier 3 secondary site.

## Related Information

[SAP HANA Administration Guide](#)

---

## 5.3.4 Performance (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features for monitoring and managing performance are available in SAP HANA studio.

### Operator List for Plan Visualizer (New)

- The Operator List shows detailed characteristics of all operators within a current (visualized and executed) plan.
- It can be used to dynamically explore the operator set along user defined filters in order to pinpoint specific operators of interest.

### Enhancements to SQL plan cache (New and Changed)

- The parameter set of a prepared statement is stored in the monitoring view `M_SQL_PLAN_CACHE_PARAMETERS` to allow a specific query to easily be re-executed.
- The first parameter set is stored when the total execution time of the statement is greater than a preset threshold  
Parameter `plan_cache_parameter_sum_threshold` (default 100000ms)
- Afterwards the parameter values will be updated if the statements single execution time is greater than another preset threshold (parameter `plan_cache_parameter_threshold` (default 100ms)) and its last captured execution time.
- If a statement is evicted from the SQL Plan Cache, its parameter information will also be removed from the `M_SQL_PLAN_CACHE_PARAMETERS` view.
- Parameters to enable this feature:
  - `plan_cache_parameter_enabled`: Activate or deactivate capture of parameter values of prepared statements
  - `plan_cache_parameter_for_lob_enabled`: Activate or deactivate capture of BLOB/CLOB/NCLOB parameter values.
- The stored parameter set is used when you right click a statement and choose either [Visualize Plan](#) or [Prepare in SQL Console](#) in the Administration editor of SAP HANA studio under [Performance > SQL Plan Cache](#)

### Memory Tracking Parameters (New)

Statement memory tracking and statement memory limitation help you avoid uncontrolled statement memory allocation

- The peak memory consumption of a statement can be tracked and displayed in Expensive Statements.
- Resource consumption collection has to be enabled manually:  
Configuration file `global.ini`, parameters `enable_tracking` and `memory_tracking`

- Additionally the SAP HANA administrator is able to define a global statement memory limit in the database:  
Configuration file global.ini, parameter statement\_memory\_limit
- If a statement exceeds the memory limit, it will be canceled

## Related Information

[SAP HANA Troubleshooting and Performance Analysis Guide](#)

## 5.4 Data Provisioning

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available for data provisioning.

### 5.4.1 Log-Based Replication with SAP Replication Server (New and Changed)

As of SAP HANA Platform SPS 08 (Revisions 80), changed features are available for log-based replication with SAP Replication Server (SRS).

Using SAP Replication Server 15.7.1 SP200, you can replicate data from SAP Business Suite running on SAP ASE, MSSQL, DB2 UDB LUW or Oracle into the SAP HANA database. After installation of the replication components, use the new Replication Management Agent to configure the environment for replication to the SAP HANA database. Also supported is the homogenous SAP HANA to SAP HANA database replication, using trigger-based replication.

### 5.4.2 SAP HANA Smart Data Access

As of SAP HANA Platform SPS 08 (Revision 80), SAP HANA smart data access provides support for use of the IBM DB2 LUW ver10.1 driver and the IBM Netezza 7 Driver. (DB2 iSeries and zOS are not supported.), support for a new SQL command: ALTER REMOTE SOURCE and support for Analytic and Attribute Views for Virtual Tables using the Calc View migration wizard.

## Related Information

[SAP HANA Administration Guide: chapter About SAP HANA Smart Data Access](#)

---

## 5.4.3 Unified Data Provisioning (Deprecated)

The unified data provisioning feature will no longer be available with SPS 09.

For more information see SAP Note 2006819.

### Related Information

[SAP Note 2006819](#) ➔

## 5.5 Development

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available for development.

### 5.5.1 Documentation Changes

As of SAP HANA Platform SPS 08 (Revision 80), the SAP HANA developer documentation and references have been changed or restructured.

- The fuzzy search reference information has been removed from the Developer Guide and can be found in the Reference section and entitled *SAP HANA Fuzzy Search Reference Guide*.
- Secure programming information is now included.
- The *SAPUI5 Reference Guide* is now entitled *SAPUI5 Developer Guide*. It is located in the Development section on the SAP HANA Platform help portal.
- The *SAP HANA LCM Tools Reference Guide* has been restructured. Available call options for each LCM program now appear as a list in Related Information. Each list item is a link to the corresponding call option topic in the *Call Option Reference*.

### Related Information

[SAP HANA Fuzzy Search Reference](#)

[SAPUI5 Developer Guide for SAP HANA](#)

[SAP HANA LCM Tools Reference Guide](#)

## 5.5.2 SAP HANA Modeling (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available in the SAP HANA Modeling.

- **Map Input Parameters and Variables in Analytic and Calculation Views (Changed)**  
You can map the parameters or variables of external views for value help (external views as value help references in variables and input parameters) to the parameters or variables of analytic views and of calculation views.
- **Higher Precision for Currency Conversion (Changed)**  
You can now specify the data type of base measure used in currency conversions. By specifying the data type of the measure as DECIMAL, you can preserve the precision of currency conversions.
- **Sorting Parent-Child Hierarchies (Changed)**  
Enhancements made to Parent-Child hierarchies now support sorting with Order By and Sort Direction features.
- **Package Specific Default Schema (New)**  
In the new table M\_PACKAGE\_DEFAULT\_SCHEMA, you can maintain a package specific default schema for the objects that are defined in specific packages using SQL statements such as INSERT, DELETE and UPDATE. The system automatically creates this table while you update your existing SAP HANA instance or when you install a new SAP HANA instance.  
You can copy the content delivered by SAP to the target root package (or to subpackages within the root package) and maintain package mapping accordingly.
- **SAProuter String (Changed)**  
You can use the SAProuter string to establish a connection to the SAP NetWeaver Business Warehouse (BW) System over the Internet for importing BW objects.
- **Activate Secure Network Connections (Changed)**  
You can use Secure Network Connections (SNC) to encrypt the data communication paths between SAP HANA Studio and your SAP NetWeaver BW system.
- **Performance Analysis (New)**  
A new Performance Analysis panel for information views (except script-based calculation views) helps users to identify:
  - The tables with number of rows above a user defined threshold. Users can define this threshold value by choosing ► [Windows](#) ► [Preferences](#) ► [SAP HANA](#) ► [Modeler](#) ► [Performance Analysis](#) ►.
  - The tables that they have partitioned and the type of partition used (Hash, Range, Round Robin, Multilevel).
- **DECIMAL Data Type (Changed)**  
You can use the data type DECIMAL without having to mention its length. For data type DECIMAL, the length specifies the total number of digits (the sum of whole digits and fractional digits), and scale specifies the number of fractional digits. If users do not specify the length and scale, DECIMAL becomes a floating-point decimal number (FLOAT).
- **Alert message to users working in a production system (New)**  
The system displays an alert message to inform you if you are performing certain critical activities (for example, activating and redeploying objects, importing SAP NetWeaver BW objects, schema mapping, importing delivery units, deleting objects, data provisioning, generating time data, and so on) in a production system.
- **Support for Unicode Characters (New)**  
You can now use Unicode character sets in name fields of information views, and in names of its elements (such as input parameter names, variable names, hierarchy names, and so on). Unicode characters allow you to use multilingual text of languages you desire. The SAP HANA Modeler perspective supports

---

Unicode characters with the exception of a small subset. The list of Unicode characters that are not supported in the current release includes, slashes ( / , \ ), colon and semi-colon ( : , ; ), asterisk ( \* ), question mark ( ? ), single and double quotes ( " , ' ), lesser than and greater than ( < , > ), pipe ( | ), comma ( , ), dollar ( \$ ), percentage ( % ), exclamation mark ( ! ), hash sign ( # ), plus sign ( + ), ampersand ( & ), period ( . ) and space.

## Related Information

[SAP HANA Modeling Guide](#)

### 5.5.3 SAP HANA Spatial (New and Changed)

As of SAP HANA Platform SPS 08 (Revisions 80), new and changed features are available in the SAP HANA Spatial.

The following methods are new:

- `ST_AsSVG`
- `ST_Boundary`
- `ST_ExteriorRing`
- `ST_GeometryN`
- `ST_InteriorRingN`
- `ST_IsSimple`
- `ST_NumGeometries`
- `ST_NumInteriorRings`
- `ST_NumInteriorRing`
- `ST_PointOnSurface`

The following SQL statement are new:

- `CREATE SPATIAL REFERENCE SYSTEM`
- `CREATE SPATIAL UNIT OF MEASURE`

The following import and export formats are now supported:

- Extended Well Known Text (EWKT)
- Extended Well Known Binary (EWKB)
- Scalable Vector Graphic (SVG) files

The following methods have been changed (new parameter `unit_name` (Unit of Measurement)):

- `ST_Area`
- `ST_Buffer`
- `ST_Distance`
- `ST_Length`
- `ST_WithinDistance`

---

The following methods now return BLOB (Binary Large Object):

- `ST_AsBinary`
- `ST_AsEWKB`
- `ST_AsWKB`

The following methods now return CLOB (Character Large Object):

- `ST_AsEWKT`
- `ST_AsGeoJSON`
- `ST_AsText`
- `ST_AsWKT`
- `ST_AsSVG`

## Related Information

[SAP HANA Spatial Reference](#)

## 5.5.4 SAP HANA Extended Application Services (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available in the SAP HANA Extended Application Services (XS).

In addition to providing application-specific consumption models, SAP HANA XS also hosts system services that are part of the SAP HANA database, for example: search services and a built-in Web server that provides access to static content stored in the SAP HANA repository. SAP HANA XS includes the following updates and additions:

- [Wizards \(new and changed\) \[page 68\]](#)
- [Server-side Version Management \(Changed\) \[page 68\]](#)
- [Artifact Editors \(Changed\) \[page 68\]](#)
- [Artifact References \(New\) \[page 69\]](#)
- [SQL Connection Configuration \(Changed\) \[page 69\]](#)
- [XS Job Schedule \(Changed\) \[page 69\]](#)
- [HTTP Destinations and Extensions \[page 69\]](#)
- [Browser-Based Integrated Development Environments \(Changed\) \[page 70\]](#)
- [SAP HANA Application Lifecycle Management \(New and Changed\) \[page 70\]](#)
- [SAP HANA Change Management \(Changed\) \[page 70\]](#)

---

## SAP HANA XS Artifact-Creation Wizards (New and Changed)

Changes have been made to the way in which wizards provided by the SAP HANA studio help you create new artifacts in the SAP HANA Repository:

- **New XS Projects**  
There is a new option to automatically share an XS Project with the SAP HANA Repository when using the SAP HANA studio's project creation wizard. The default setting for creating a new project is **shared**. You can still choose to create an unshared project and share it at a later time as in previous releases.
- **File creation**  
A default templates is provided if you use the SAP HANA studio's file-creation wizard to add the following repository artifacts:
  - XS JavaScript service (XSJS)
  - XS OData service (XSODATA)
  - Application access file (XSACCESS)
  - HTTP destination file (XSHTTPDEST)
  - SQL Connection Configuration (XSSQLCC)
  - XS Job-schedule definition (XSJOB)

## Server-side Version Management (Changed)

Changes have been made to the way in which you can view, manage, and use the various versions of artifacts in the SAP HANA Repository.

- **Version visibility**  
All versions of artifacts (stored on the server) are now visible in the SAP HANA studio from both the [Project Explorer](#) and [Repositories](#) views.
- **Version management**  
In the SAP HANA studio, developers now have the option to restore previous versions of an artifact or compare specific versions of a Repository artifact .

## Artifact Editors (Changed)

Changes have been made to some of the dedicated editors provided with the SAP HANA studio to help create and maintain specific artifacts in the SAP HANA Repository.

- **Syntax highlights**  
The SAP HANA studio's embedded XS OData editor uses colors to highlight the keywords, parameters, options, and values required to create and maintain an XS Odata service.
- **Code Completion**  
When creating an OData service or a CDS artifact, the SAP HANA studio's dedicated editors monitor the code you type and provide a list of suggestions based on what you type.



---

## Artifact References (New)

Changes have been made to way in which the SAP HANA studio's development tools display information about references to artifacts in the SAP HANA Repository, for example, where or how often an artifact is used.

- **Artifact references**  
You can now use the [Where-Used](#) option in SAP HANA studio to display a list of references to a selected Repository artifact; the [Where-Used](#) option is available for any shared project or in the [Repository](#) view.
- **Searches**  
The searches performed by the SAP HANA studio's [Where-Used](#) option considers all inactive versions present in your workspace as well as all active versions available in the server-side Repository.

## SQL Connection Configuration (Changed)

Changes have been made to the options that available when using the Web-based [XS Administration Tool](#) to maintain the details of an SQL connection configuration:

- **Password**  
The SAP HANA administrator must supply a password for the database user, whose account is used to open the configured SQL connection.

## XS Job Schedule (Changed)

Changes have been made to the options that are available when using the Web-based [XS Administration Tool](#) to maintain the details of an XS Job schedule.

- **Password**  
The SAP HANA administrator must supply a password for the database user, whose account is used to run the scheduled job in SAP HANA XS.

## HTTP Destinations and Extensions

Changes have been made to the options that are available when using the Web-based [XS Administration Tool](#) to maintain the details of HTTP destinations (and any extensions associated with the destinations) that are used by SAP HANA XS applications.

- [Edit](#) button  
Only available if an HTTP destination includes additional configuration details in a corresponding XS HTTP extension file. The [Edit](#) button displays details of the HTTP **extension** associated with a specific HTTP destination configuration, and enables you to maintain details of the extension configuration.
- [Extend](#) button  
Available when using the [SAP HANA XS Administration Tool](#) to view an HTTP destination (for example, provided as part of a delivery unit (DU)). The [Extend](#) button enables you to associate the HTTP destination with an HTTP extension. The HTTP extension can be in the same package or another package (new or existing).

---

## SAP HANA Change Management (Changed)

*Change Management* as a concept is now referred to as *Change Recording*.

## Browser-Based Integrated Development Environments (Changed)

SAP HANA XS provides a Web-based development tool which you can use for development tasks, for example, creating and editing development objects, without the need for SAP HANA studio. The Web-based Development Workbench includes the following new and changed features:

- Syntax highlighting and formatting has been extended to more development artifacts (changed)
- Maintain credentials feature allows navigation to the supporting admin tool for additional setup (new)
- Search feature supports any starting point in the repository package hierarchy for any string (changed)
- Recursive deletion of a package and all child objects/packages (new)
- Recursive copy of a package and all child objects/packages (new)
- Debugger now shows the `Globals` variable in addition to the `Locals` variable (new)
- Immediate feedback function allows the isolated execution of single XS JavaScript functions using the debugger while coding (new)
- Function flow feature shows the XS JavaScript logic flow and function dependencies (new)
- Change Recording (change tracking) has been enabled in the Web-based Development Workbench (new)

## SAP HANA Application Lifecycle Management (New and Changed)

New and changed features in the Web-based Application Lifecycle Management tool include:

- CTS Transport Integration (Changed)  
You can now transport changes to multiple HANA servers simultaneously using the CTS Transport feature.
- Change Manager View (New)  
The Change Manager view allows you to see changes that have been made by all users before you transport them. This feature provides a means of viewing potentially concurrent changes made to objects.
- Application Installation using Command Line (New)  
You can use a command-line tool to install an application for testing; the executable file is included with the installation of SAP HANA.

## Related Information

[SAP HANA Developer Guide](#)

## 5.5.5 SAP HANA Predictive Analysis Library (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and enhanced features are available for SAP HANA Predictive Analysis Library.

### New Algorithms

- **Distribution Fitting**

This algorithm aims to fit a probability distribution for a variable according to a series of measurements to the variable. In PAL, you can choose one probability distribution type from a supporting list (Normal, Gamma, Weibull, and Uniform) and then PAL will calculate the optimized parameters of this distribution which fit the observed variable best.

- **Cumulative Distribution Function**

This algorithm evaluates the probability of a variable  $x$  from the cumulative distribution function (CDF) or complementary cumulative distribution function (CCDF) for a given probability distribution.

- **Quantile Function**

This algorithm evaluates the inverse  $F^{-1}(x)$  of the cumulative distribution function (CDF) or the inverse  $\bar{F}^{-1}(x)$  of the complementary cumulative distribution function (CCDF) for a given probability  $p$  and probability distribution.

- **Random Distribution Sampling**

This is a random generation function with a given distribution (Normal, Gamma, Weibull, and Uniform).

- **ARIMA**

The Autoregressive Integrated Moving Average (ARIMA) algorithm is famous in econometrics, statistics and time series analysis. An ARIMA model can be written as ARIMA (p, d, q), where p refers to the autoregressive order, d refers to integrated order, and q refers to the moving average order. With ARIMA, you can understand the time series data better and predict future data in the series. Both training and forecast functions are provided.

- **FP-Growth**

This algorithm finds frequent patterns from transactions without generating a candidate itemset. In PAL, FP-Growth is extended to find association rules.

- **CART**

The Classification and Regression Tree (CART) algorithm is used for classification or regression and only supports binary split. CART is a recursive partitioning method similar to C4.5 decision tree. It uses GINI index or TWOING for classification, and least square error for regression. The surrogate split method is used to support missing values when creating the tree model.

- **K-Medoids**

This is a clustering algorithm related to the K-means algorithm. Both k-medoids and k-means algorithms partition  $n$  observations into  $k$  clusters in which each observation is assigned to the cluster with the closest center. In contrast to k-means algorithm, k-medoids clustering does not calculate means, but medoids to be the new cluster centers. A medoid is defined as the center of a cluster, whose average dissimilarity to all the objects in the cluster is minimal.

---

## Enhanced Algorithms


- **Logistic Regression**
  - Supports cancellation at runtime.
  - Supports multi-nomial classification.
- **K-Means**
  - Determines best k given a range according to Slight Silhouette.
- **Apriori**
  - Added prefix tree implementation for potential performance improvement with regards to memory consumption and time cost.
  - Added rule filter to define some items only allowed in the left-/right-hand side of the association rules.
- **Forecast Smoothing**
  - Automatically detects the best model among Single/Double/Triple Exponential Smoothing models.
- **Agglomerate Hierarchical Clustering**
  - Supports categorical attributes as inputs.
- **Univariate Statistics**
  - Supports population variance and standard deviation.
  - Calculates lower/upper quartile for the data.
- **CHAID Decision Tree**
  - Treats missing values as special values.
  - Adds support for the Equal Frequency discretization method.
  - Adds the MAX\_BRANCH parameter to limit the number of branches.
  - Adds the SPLIT\_THRESHOLD and MERGE\_THRESHOLD parameters to specify stop and merge conditions.

## Related Information

[SAP HANA Predictive Analysis Library \(PAL\)](#)

### 5.5.6 SAPUI5 (Changed)

As of SAP HANA Platform SPS 08 (Revision 80) the UI development toolkit for HTML5 (SAPUI5) is upgraded from version 1.16 to 1.20.

Find a detailed list of new and enhanced functions here: [SAPUI5 Release Notes](#) 

## Related Information

[SAPUI5 Developer Guide for SAP HANA](#)

---

## 5.5.7 File Loader for SAP HANA (New)

As of SAP HANA Platform SPS 08 (Revision 80), a file loader for loading the text representation of files stored on HTTP servers into the SAP HANA database is available.

The file loader is a set of HTTP services to develop your own applications to search in file content. It is used to load the text representation of files that are stored on HTTP servers, into the SAP HANA database. Afterwards, it is possible to run services such as search on this content.

The file loader is an SAP HANA XS application that is shipped as an SAP HANA delivery unit. It loads files both asynchronously and in parallel from HTTP servers. The binary file content is converted and stored as a textual representation in SAP HANA to enable search, for example. The package includes a basic example application that allows Web-based access to the capabilities of the file loader. Other features include:

- Job scheduling
- Monitoring commands
- Statistic commands

### Related Information

[File Loader Guide for SAP HANA](#)

## 5.5.8 SAP HANA Data Provider for Microsoft ADO.NET

As of SAP HANA Platform SPS 08 (Revision 80), the new feature SAP HANA Data Provider for Microsoft ADO.NET is available, enabling Microsoft ADO.NET applications to access SAP HANA database functionality.

Support for SAP HANA database access from Microsoft ADO.NET applications has been enhanced by a new optimized native data provider. The data provider implements the new `Sap.Data.Hana` namespace and enables you to write programs in any language supported by Microsoft .NET, for example, C# and Visual Basic, and access data from SAP HANA database servers. The `Sap.Data.Hana` namespace permits direct access to SAP HANA database functionality, offering better performance than Microsoft's `System.Data.Odbc` namespace with an ODBC driver.

### Related Information

[SAP HANA Data Provider for Microsoft ADO.NET Reference](#)

## 5.5.9 SAP HANA Interactive Education (SHINE) (New and Changed)

As of SAP HANA Platform SPS 08 (Revision 80), new and changed features are available in the SAP HANA Interactive Education (SHINE).

### Note

Use SHINE only in your test environment.

- **SAP HANA database association (New)**  
SAP HANA Extended Application Services (XS) enables you to use the Core Data Services (CDS) syntax to create managed associations between entities.
- **Spatial (New)**  
Spatial data describes the position, shape, and orientation of objects in a defined space. Spatial data is represented as 2-dimension (2D) geometries in the form of points, line strings, and polygons.
- **SAP HANA simple info access (SINA) (New)**  
The SAP HANA (SINA) API is a client-side or frontend JavaScript API for developing browser-based search user interfaces (UIs).
- **SAP HANA UI Integration Services Fiori Launchpad site (New)**  
SAP HANA UI Integration Services Fiori Launchpad site is the entry point to SAP Fiori Apps on mobile or desktop devices.
- **OData batch requests (New)**  
The OData standard allows the collection of multiple individual HTTP requests into one single batched HTTP request.
- **Fuzzy Search (New)**  
Fuzzy Search is a fast and fault-tolerant search feature for SAP HANA.
- **Tax Calculation Using Rules on SAP HANA (New)**  
The Rules for Tax Calculation is used to determine the tax code based on the Company (Business Partner ID) and Product ID.

## Related Information

[SAP HANA Interactive Education \(SHINE\)](#)

## 5.5.10 SAP HANA LCM Tools (New)

As of SAP HANA SPS Platform 08 (Revision 80), the SAP HANA lifecycle management tools include `hdbmodify`.

The SAP HANA lifecycle management tool `hdbmodify` adds or removes remote hosts to or from an SAP HANA system. You can also enable an internal network. This functionality is also available using the recommended SAP HANA lifecycle management tool, `hdblcm`. For more information about `hdblcm`, see the *SAP HANA Server Installation and Update Guide*.

---

## Related Information

[SAP HANA LCM Tools Reference Guide](#)

[SAP HANA Installation and Update Guide](#)

---

## 6 SAP HANA Platform SPS 07, Features Included in Revision 73

### 6.1 Development

#### 6.1.1 SAP HANA Interactive Education (SHINE) New and Changed

The updated documentation for SHINE is released in SAP Note 1979888. For more information, see Related Information.

New and changed features for SHINE include:

- Assigning user roles
- Generating demo data (time based)
- A new launch pad for viewing demo applications
- Exploring demo code for outbound XSJS and Job Scheduling
- Personalization and property persistence

#### Related Information

[SAP Note 1979888](#) 

#### 6.1.2 SAP HANA UI Integration Services (New and Changed)

SAP HANA UI Integration Services is enhanced by the following capabilities:

- Support of SAP Fiori Launchpad on the SAP HANA Platform
- Ability to create and design application sites of the Fiori Launchpad type
- New methods of content creation for all types of sites: content is maintained in tile catalogs



- Automatic generation of the initial specification XML file for a new widget
- Automatic generation of privileges for sites and tile catalogs
- Ability to define and assign privileges for tile catalogs
- Ability to configure a supplied Fiori Launchpad site or any other site as the home page for an SAP HANA system

## Related Information

[SAP HANA Developer Guide](#)

## 6.2 Data Provisioning

### 6.2.1 SAP Smart Data Access (SAP SDA) adapter for SAP Manufacturing Integration and Intelligence (SAP MII) (New)

The SAP Smart Data Access (SAP SDA) adapter for SAP Manufacturing Integration and Intelligence (SAP MII) can be used to connect an SAP MII back-end system through SAP SDA to an SAP HANA system. Queries on the SAP MII side are exposed as virtual tables to SAP HANA. The adapter transforms queries to their virtual tables into appropriate SAP MII service queries. The results from SAP MII are then transformed into rows of the virtual tables.

For detailed information on setting up the SAP SDA adapter for SAP MII, and for mapping queries and results, refer to the attached documentation in *SAP Note 1984859*.

## Related Information

[SAP Note 1984859](#) ➔

---

# 7 SAP HANA Platform SPS 07, Features Included in Revision 70

## 7.1 Installation and Update

### 7.1.1 Documentation Changes

A number of changes have been made to the installation and update documentation set that is provided with SAP HANA SPS 07.

- SAP HANA Master Guide (changed)
  - The topic "What's SAP HANA" was changed. The **SAP HANA tailored data center integration** was added as new deployment option.
  - The topic "Software Download" was changed. The **SAP HANA tailored data center integration** was added as new deployment option.
  - The topic "Software Components" was changed.
  - The topic "SAP HANA Guides" was changed.  
The links to the individual archives containing the SAP HANA documentation for previous Support Package Stacks were removed. The archives can be found on the SAP HANA page in the SAP Service Marketplace.
  - The topic "Important SAP Notes" was changed. New SAP Notes and application areas were added.
  - The topic "Installing SAP HANA" was enhanced.
- SAP HANA Update and Configuration Guide (changed)
  - The topic "Configuring the SAP HANA System Internal Network" was created.
  - The topic "Using SAP HANA Lifecycle Manager in Command Line Mode" was enhanced.
  - The topic "Setting up the SAP HANA Studio" was changed. The information about the supported browsers was enhanced. The section *Using Required Browsers* was renamed to *Browser Requirements for SAP HANA Studio*. The section "Configuring the connection to SAP Service Marketplace Using the Lifecycle Management Perspective" was renamed to "Configuring the connection to SAP Service Marketplace Using the Lifecycle Management Perspective in SAP HANA Studio".
  - The topic "Renaming an SAP HANA System" was enhanced. The section *SID Mounted in a File Storage on a Different Host (Optional)* was added.
  - The topic "Removing Additionally Added SAP HANA Systems From a Single SAP HANA Appliance" was enhanced.
  - The topic "Adding Application Function Libraries on an SAP HANA System" was enhanced. A *Prerequisites* section was added.

- The topic "Adding SAP liveCache Applications on an SAP HANA System" was enhanced. A *Prerequisites* section was added.
- The topic "Deploying SAP HANA Application Content Using SAP HANA Lifecycle Manager" was enhanced. Information about the content which can be deployed was added.
- The topic "Troubleshooting" was enhanced. New troubleshooting information was added.
- The topic "Important SAP Notes" was enhanced. New SAP Notes were added.
- SAP HANA Server Installation Guide (new)  
This guide describes how the components of the *SAP HANA Platform Edition* are installed with the *SAP HANA lifecycle management tool hdbldm* or the *SAP HANA lifecycle management tool hdbldm gui*. As of SPS 07, installation with these tools is the recommended installation method.
- SAP HANA Server Installation Guide (Unified Installer) (deprecated)  
The guide describing the installation of the *SAP HANA Platform Edition* with the SAP HANA unified installer was renamed from *SAP HANA Server Installation Guide* to *SAP HANA Server Installation Guide (Unified Installer)*. The SAP HANA unified installer is shipped with SPS 07, but is listed as deprecated as of SPS 07. The SAP HANA unified installer will not be shipped with future releases.
- SAP HANA Master Update Guide (changed)  
The topic "Performing an Automated Update on the SAP HANA System" was enhanced. SAP Notes were added which need to be observed during an update.
- SAP HANA LCM Tools Reference Guide (new)  
The *SAP HANA LCM Tools Reference Guide* describes the technical details and the usage of the SAP HANA lifecycle management tools.

## Related Information

[SAP HANA Master Guide](#)

[SAP HANA Update and Configuration Guide](#)

[SAP HANA Master Update Guide](#)

[SAP HANA Server Installation Guide](#)

[SAP HANA Server Installation Guide \(Unified Installer\)](#)

[SAP HANA Database - Studio Installation and Update Guide](#)

[SAP HANA Database - Client Installation and Update Guide](#)

[SAP HANA LCM Tools Reference Guide](#)

[SAP HANA page on SAP Service Marketplace](#) 

---

## 7.1.2 SAP HANA Lifecycle Management Tools hdblcm and hdblcmgui (New)

As of SPS 07, the recommended installation tools to install the components of the "SAP HANA Platform Edition" are the "SAP HANA lifecycle management tool hdblcm" and the "SAP HANA lifecycle management tool hdblcmgui".

### Related Information

[SAP HANA Server Installation Guide](#)

## 7.1.3 SAP HANA Studio Installation (Changed)

Until SAP HANA SPS 06, the installation of the SAP HANA studio was performed as administrator (Windows) or root user (Linux). As of SAP HANA SPS 07, the installation of the SAP HANA studio can also be performed without administration rights or being a root user.

When installing the SAP HANA studio without administrative rights the installed SAP HANA studio is only available to the user who installed it. The default installation folder for MS Windows is %USERPROFILE%\sap\hdbstudio and for Linux is \$HOME/sap/hdbstudio.

### Related Information

[SAP HANA Database - Studio Installation and Update Guide](#)

## 7.1.4 SAP HANA Client Installation (Changed)

Until SAP HANA SPS 06, the installation of the SAP HANA client was performed as administrator (Windows) or root user (Linux). As of SAP HANA SPS 07, the installation of the SAP HANA client can also be performed without administration rights or being a root user.

When installing the SAP HANA client without administrative rights, the installed SAP HANA client is only available to the user who installed it. The default installation folder for MS Windows is %USERPROFILE%\sap\hdbclient and for Linux is \$HOME/sap/hdbclient.

### Related Information

[SAP HANA Database - Client Installation and Update Guide](#)

---

## 7.1.5 SAP HANA Lifecycle Manager (Changed)

As of SAP HANA SPS 07, the SAP HANA lifecycle manager provides the following new and changed update and configuration features.

- SAP HANA lifecycle manager user interface now supports Safari Web browser, version 5.1 and higher.
- The SAP HANA system internal network configuration steps have been automated. For more information, see "Configuring the SAP HANA System Internal Network" in the *SAP HANA Update and Configuration Guide*.
- It is now possible to deploy selected instances from an SAP HANA application content archive. When deploying SAP HANA application content with the SAP HANA lifecycle manager, you can choose which product instances to be deployed. For more information, see "Deploying SAP HANA Application Content Using SAP HANA Lifecycle Manager" in the *SAP HANA Update and Configuration Guide*.
- You can now view information about the products and components installed in your SAP HANA system from the SAP HANA lifecycle manager starting page.
- For distributed SAP HANA systems, the rename operation for an SID mounted in a file storage on a different host is now supported. For more information, see the "SID Mounted in a File Storage on a Different Host" section in "Renaming an SAP HANA System" chapter of the *SAP HANA Update and Configuration Guide*.

### Related Information

[SAP HANA Update and Configuration Guide](#)

## 7.1.6 SAP HANA Unified Installer (Deprecated)

The SAP HANA unified installer is shipped with SPS 07, but is listed as deprecated as of SPS 07. The SAP HANA unified installer will not be shipped with future releases.

## 7.2 Security

## 7.2.1 SAP HANA Security (New and Changed)

As of SAP HANA SPS 07, the following new and changed security-related features are available.

### Authentication (New and Changed)

- It is now possible to re-enable the mandatory periodic password change if it was previously disabled using the following SQL statement:  

```
ALTER USER <user_name> ENABLE PASSWORD LIFETIME
```
- The following password policy parameters have been changed:
  - `maximum_unused_initial_password_lifetime`  
This parameter specifies the number of days for which initial user passwords are valid. If a user has not logged on within this period of time, the password becomes invalid.  
The default value for this parameter has been changed from 28 to 7 days.
  - `password_lock_time`  
This parameter specifies the number of minutes for which a user is locked after the maximum number of failed logon attempts. It is now possible to lock a user indefinitely by specifying the value `-1`. In the [Security](#) editor of the SAP HANA studio, this setting corresponds to selecting the [Lock indefinitely](#) checkbox.
- SAP HANA XS applications now support Simple and Protected GSSAPI Negotiation Mechanism (SPNEGO) for authentication with Kerberos for web-based (HTTP) access.
- For JDBC/ODBC access, users can now be authenticated by logon tickets issued by an SAP system configured to create logon tickets (for example, the SAP Web Application Server or Portal).

### User and Role Management (New and Changed)

- You can now set the validity period for a user in the SAP HANA studio.
- If you are implementing user authorization through roles created in the SAP HANA repository, it is now possible to create a new user by copying an existing user. The repository roles granted to the existing user are automatically granted to the new user. Note that the standard SQL roles (for example, MONITORING, MODELING) **cannot** be copied with this feature.

### Authorization

- The following new system privileges are available for repository change management:
  - `REPO.CONFIGURE`
  - `REPO.MODIFY_CHANGE`
  - `REPO.MODIFY_FOREIGN_CONTRIBUTION`
  - `REPO.MODIFY_OWN_CONTRIBUTION`

These privileges can be assigned in the user editor of the SAP HANA studio.

- You can now allow other users to debug SQLScript code in your session by granting them the new privilege ATTACH DEBUGGER. This privilege can be granted in the user editor of the SAP HANA studio on the new [Privileges on Users](#) tab. In addition to the privilege ATTACH DEBUGGER, the debugging user requires the object privilege DEBUG on the relevant SQLScript procedure.
- The SQL privileges CREATE VIRTUAL TABLE and DROP used in SAP HANA smart data access scenarios can now be granted using the SAP HANA studio.

## Network Security

- SAP HANA now supports SAP's new cryptographic library `CommonCryptoLib` for operations that require cryptography, for example, encrypting communication using the Secure Sockets Layer (SSL) protocol. `CommonCryptoLib` is the successor of the SAP Cryptographic Library (SAPCRYPTOLIB version 5.5.5).
- The parameters for configuring SSL-secured external communication (that is, communication between SAP HANA and ODBC, JDBC, and HTTP clients) have been moved from the `indexserver.ini` configuration file to the `global.ini` configuration file.
- SSL can now be used to secure internal communication between primary and secondary sites in system replication scenarios. The following new parameters are available in the `global.ini` configuration file:
  - `enable_ssl`
  - `sslInternalKeyStore`
  - `sslInternalTrustStore`
  - `sslInternalValidateCertificate`

Separate personal secure environments (PSEs) can be configured for internal and external communication.

- A new parameter is available in the communication section of the `global.ini` configuration file that allows an administrator to enforce all client SQL connections to the SAP HANA database to use SSL. If the parameter `sslEnforce` is set to `true`, connection attempts by clients that do not use SSL are rejected.

### Caution

After an upgrade to SPS 07, you can migrate to a new implementation of the statistics server. Do not enforce SSL for client connections unless you have migrated to the new implementation. For more information about changes to the statistics server, see [SAP HANA System Administration \(New and Changed\)](#) [page 86].

## Data Storage Security (New and Changed)

- Data volume encryption on disk can now be configured in the [Security](#) editor of the SAP HANA studio.
- If a storage snapshot is created for data backup, the root encryption key for data volume encryption is now included in the backup of the secure storage in the file system (SSFS). For more information about storage snapshots, see [SAP HANA Backup and Recovery \(New and Changed\)](#) [page 88].
- You can now change the SSFS master key using the command line tool `rsecssfx`. This master key protects all root encryption keys used in an SAP HANA system, that is the root encryption key for data volume encryption and the internal credential store.

To allow you to save the new key to a secure location known to SAP HANA, a new parameter `ssfs_key_file_path` is available in the cryptography section of the `global.ini` configuration file.

- A new check (57) determines whether the SSFS is accessible to the database. A high priority alert is issued if the SSFS is not available.

## Auditing (New and Changed)

- SAP HANA can now write the audit trail to a column store database table in the SAP HANA database, accessible through the public system view `AUDIT_LOG`.  
Using an SAP HANA database table as the target for the audit trail makes it possible to query and analyze auditing information quickly. It also provides a secure and tamper-proof storage location. Only `SELECT` operations can be performed on the `AUDIT_LOG` view by users with either the system privilege `AUDIT ADMIN` or the new system privilege `AUDIT OPERATOR`.  
To avoid the audit table growing indefinitely, it is possible to delete and archive old audit entries. This operation can be performed only by users with the system privilege `AUDIT OPERATOR`.  
You can configure [Database Table](#) as the audit trail target and delete old audit entries in the [Security](#) editor of the SAP HANA studio.
- If auditing is active, the following actions are now always audited and are therefore not available for inclusion in user-defined audit policies:
  - Creation, modification, or deletion of audit policies
  - Deletion of audit entries from the audit trail  
This only applies if audit entries are written to the database table audit trail.
  - Changes to auditing configuration
- The following new actions can be audited: `CREATE TABLE` and `ALTER TABLE`
- The audit trail now has an additional field for application user name.
- Creating an audit policy that audits all actions of a particular user now covers not only all other actions that can be audited individually but also actions that cannot otherwise be audited. Such a "firefighter" policy is useful if you want to audit the actions of a particularly privileged user.

### Note

The actions that are audited are limited to those that take place inside the database engine while it is running. Therefore, system restart and system recovery will not be audited.

- When creating an audit policy, you can now specify that the actions in the policy are audited when performed by all users **except** a particular user or users. This can be useful, for example, if you want to exclude the technical database user used by an application server to connect to SAP HANA.

## 7.3 System Administration



---

## 7.3.1 Documentation Changes

A number of changes have been made to the Administration documentation set that is provided with SAP HANA SPS 07.

### **SAP HANA Administration Guide (Changed)**

To improve overall navigation in the SAP HANA Administration Guide a number of new sections have been created to group together related topics such as System Administration, Security Administration, Availability and Scalability, SAP HANA XS Administration Tools, Administration of SAP HANA Data Provisioning Technologies, and SAP HANA HDBSQL (Command Line Reference).

The chapter on *Backing Up and Recovering the SAP HANA Database* is now found under Availability and Scalability. Additionally the chapter on *Table Partitioning in the SAP HANA Database* was moved from the chapter on Availability and Scalability to the chapter Managing Tables under System Administration.

### **SAP HANA Lifecycle Management (LCM) - (New)**

New section with the following guides:

- SAP HANA Update and Configuration Guide
- SAP HANA LCM Tools Reference Guide

### **SAP HANA Technical Operations Manual (Changed)**

The SAP HANA tailored data center integration was added as a deployment option.

### **SAP HANA Performance Analysis Guide (New)**

This new guide describes what steps you can take to identify and resolve specific performance issues and what you can do to enhance the performance of your SAP HANA database in general.

## **Related Information**

[SAP HANA Administration Guide](#)

[SAP HANA Technical Operations Manual](#)

[SAP HANA Update and Configuration Guide](#)

[SAP HANA LCM Tools Reference Guide](#)

[SAP HANA Performance Analysis Guide](#)

## 7.3.2 SAP HANA System Administration (New and Changed)

As of SAP HANA SPS 07, the following new and changed administration and monitoring features are available.

### Monitoring (New and Changed)

- The SAP HANA studio includes the following new web-based editors for monitoring:
    - The [Resource Utilization](#) editor enables you to visualize and explore, across a range of measures, the usage history of CPU, memory and, disk. The system views in the `_SYS_STATISTICS` schema provide the information with which all values for historical resource utilization are calculated. You can access the [Resource Utilization](#) editor from the [Systems](#) view.
    - The [Memory Overview](#) editor presents a graphical breakdown of the main categories of current memory usage (host physical memory, SAP HANA database, tables, and database management). System views provide the information with which all values for memory usage are calculated. You can access the [Memory Overview](#) editor from the [Systems](#) view.
    - The [Memory Allocation Statistics](#) editor enables you to visualize and explore the current and historical memory allocation of every service in the SAP HANA database. System views provide the information with which values for memory allocation are calculated. You can access the [Memory Allocation Statistics](#) editor from the Administration editor (▮ [Landscape](#) ▸ [Services](#) ▸ sub-tab).
  - The usability of the [Performance](#) tab of the Administration editor of the SAP HANA studio has been improved. The [Threads](#), [Sessions](#), and [Blocked Transactions](#) sub-tabs have the following new features:
    - A new filter allows you to hide idle sessions, as well as sessions originating in the Administration editor or the SAP HANA studio.
    - A new context menu entry ([Navigate To](#)) allows you to jump easily between related objects. For example, from a session on the [Sessions](#) sub-tab, you can navigate to threads with the same connection ID on the [Threads](#) sub-tab.
    - A new context menu ([Configure Trace](#)) allows you to activate the performance trace, SQL trace, and expensive statements trace using user and application information from the selected object (session, thread, or blocked transaction).
- In addition, the [Threads](#) and [Sessions](#) sub-tabs have a new [Summary](#) section that provides you with aggregated information about threads and sessions in the system.
- The [Alerts](#) tab of the Administration editor of the SAP HANA studio has a new [Summary](#) section that provides you with aggregated information about current alerts.
  - The configuration dialogs for setting up system replication and performing a takeover in the SAP HANA studio have been improved. New options allow you to control the following:
    - Automatic start of secondary system after registration
    - Automatic stop of primary system if still running at the time of takeover

## Tracing (Changed)

- The feature for collecting diagnosis information on the [Diagnosis Files](#) tab of the Administration editor of the SAP HANA studio has new options that allow you to limit the scope of information collected. When you trigger the collection of diagnosis information, you can now choose between the following options:
  - Collect all diagnosis information but only for a limited number of days
  - Create and collect a runtime environment (RTE) dump file only

The corresponding options in the underlying Python support script `fullSystemInfoDump.py` are as follows:

- `--days=<no. of days>[...]`
- `--rtedump`

- New information messages in the database trace configuration dialog in the SAP HANA studio inform you when trace levels configured at the service level differ from those configured at the system level. This helps you to avoid configuring the database trace incorrectly.

## Administration of System Connections

- To allow users who work in the SAP HANA studio to connect efficiently to multiple SAP HANA systems, you can now manage a list of all systems in a centrally accessible archive and then have users simply link to it. This feature is available from the context menu of the [Systems](#) view.
- In the SAP HANA studio, it is now possible to log off from an SAP HANA system and close all connections to the system. To be able to connect to system again, you must log on. Whether or not you are logged on to systems when you start the SAP HANA studio depends on whether or not you were logged on when you closed the studio. By default, if you were logged on when you closed the studio, you are logged on automatically, and vice versa. This behavior can be configured in the preferences of the SAP HANA studio.

## Statistics Server (Changed)

The statistics server is the component of the SAP HANA database that provides internal monitoring functions. It continuously collects information about system status, performance, and resource usage, and issues alerts in the event of problems.


As of SPS 07, it is possible to switch to a new mechanism whereby data collection and alerting are implemented through the execution of SQLScript procedures.

This has the following advantages:


- The statistics server component (`statisticsserver` service) is no longer required. By replacing the statistics server with internal procedure calls, overall system performance is improved with reduced disk usage, memory usage, and data transfer.
- The `statisticsserver.ini` properties file is no longer required to contain all configuration information relating to data collection and alerting. Instead this information is contained in new tables in the `_SYS_STATISTICS` schema. This increases the overall flexibility with which data collection and alerting can

---

be configured. For example, data collectors and checks can be scheduled more flexibly, new collectors and checks can be added more easily, and data collectors and checks can be deactivated.

For more information about how to migrate to the new mechanism after an upgrade, see SAP Note [1917938](#) .

## Hardware Checks for Tailored Data Center Integration

To allow you to check if your hardware is optimally configured to meet the requirements of SAP HANA when using the tailored data center deployment option, you can use a new supportability tool called the SAP HANA HW Configuration Check Tool. See SAP Note [1943937](#) .

## 7.3.3 SAP HANA Backup and Recovery (New and Changed)

As of SAP HANA SPS 07, the following new and changed features are available for database backup and recovery.

### Storage Snapshots

SAP HANA supports backup and recovery (including point-in-time recovery) using storage snapshots.

There is a loose coupling between SAP HANA and the storage system:

You can prepare storage snapshots from SAP HANA studio or using SQL statements. A manual step is needed in the storage tool to create the storage snapshot. The storage tool confirms the creation of the storage snapshot to SAP HANA.

Storage snapshots are recorded in the SAP HANA backup catalog.

You can perform a recovery from SAP HANA studio or using SQL statements. When you perform a recovery using a storage snapshot, you have to select one of the storage snapshots from the SAP HANA backup catalog and manually make it available in the SAP HANA data area.

### Scale-out Support

When a new host is added, SAP HANA now records this and automatically writes an initial backup for this new host.

The backup history is not interrupted.

Prior to SAP HANA SPS 07, it was necessary to perform a complete data backup after a new host was added. Users were recommended not to work in the database until the data backup had finished.

## Log Mode LEGACY

From SAP HANA SPS 07, log mode LEGACY has been deactivated.



Log mode legacy has not been recommended since SAP HANA SPS 03.

If a system is still running in log mode LEGACY, an upgrade to SAP HANA SPS 07 will fail. The log mode first needs to be set to either NORMAL or OVERWRITE.

### Note

For production systems, we recommend using log mode NORMAL because it provides the highest security for data recovery. In log mode NORMAL, the system automatically creates log backups that can be used for a recovery in addition to the data backups. However, automatic log backups require more backup space. For this reason, an operational concept for administering data and log backups is a prerequisite for using log mode NORMAL.

For more information, see the following SAP Notes:

- [1645183](#)  - Changing log mode for SAP HANA DB
- [1823343](#)  - Deactivate log mode LEGACY with SAP HANA SPS 07

## Name Format for Log Backups (Changed)

With SAP HANA SPS 7, the backup ID is now appended to the log backup file name.

### Note

Log backups with the old file name layout can still be used for recovery.

## Recovery from the Command Line

SQL statements for recovery cannot be executed using the normal SQL clients such as `hdbsql` and cannot be executed when the database is online. For this reason, the Python script `recoverSys.py` is used to pass SQL statements to SAP HANA.

## Enhanced Automatic Checks at the Start of a Recovery

In addition to checking for missing backups at the start of a recovery, SAP HANA now also automatically checks whether a recovery is likely to be successful.

If an issue is detected, for example, the size or backup ID does not match the information in the backup catalog, the recovery is not started. Details are displayed in the recovery wizard and written to the backup log.

### Note

If a third-party backup tool is used, only the existence of the required backups on the third-party backup server is verified.

## Enhanced Recovery Progress Reporting in SAP HANA Studio

Progress reporting for a recovery now shows the recovery in greater detail.

The recovery wizard now shows the following phases:

- Phase 1: Data recovery  
Using data backup or snapshot
- Phase 2: Log recovery  
Using log backups and/or logs that are still available in the log area
- Phase 3: Restart

## Cancel Recovery

You can now cancel a running recovery from SAP HANA studio.

### Note


After you have canceled a recovery, the database is in an inconsistent state. For this reason, you have to start a new recovery.

## Integrity Checks

SAP HANA can check data and log backups for integrity using the command line tool `hdbbackupcheck`.

For more information, see SAP Note [1869119](#)  - Checking backups using `hdbbackupcheck`

You can now check whether you can reach a specified recovery target using the available backups.

For more information, see SAP Note [1873247](#)  - Checking backups using `hdbbackupdiag -check`.

## Migration of the Statistics Server

SAP HANA records the migration of the statistics server so that a recovery to a point in time before the migration does not require any additional user action.

---

## Certification

The following tools are currently certified for Backint for SAP HANA:

- Symantec NetBackup
- IBM Tivoli Storage Manager for Enterprise



More information: [Overview of all certified tools](#) 

For more information about the support process, see the following SAP Notes:

- SAP Note [1913568](#)  (Symantec NetBackup)
- SAP Note [1913500](#)  (IBM Tivoli Storage Manager)

Certification is an installation prerequisite for backup tools using the Backint for SAP HANA interface.

More information:

- SAP Note [1730932](#)  (Using backup tools with Backint)
- ["Backint for SAP HANA" Certification Available Now](#) 

## 7.3.4 SAP HANA Availability and Scalability (New and Changed)

As of SPS 07 the following new and changed scalability and high availability features are available.

### SAP HANA System Replication (New and Changed)

- SAP HANA system replication has been extended. In Multitier system replication, synchronous replication can be used as the source for asynchronous replication in a chained setup of primary site, tier 2 secondary site and tier 3 secondary site.
- It is now possible to enable SSL to secure network communications between primary and secondary systems.
- Support for Zero Downtime maintenance of AS ABAP applications on top of SAP HANA.
- Compressed log transfer.

## Scaling SAP HANA

- **Table Replication (New)**

In a scale-out system it is now possible to replicate tables to multiple hosts. This is useful when slowly changing master data often has to be joined with tables or partitions of other tables that are located on multiple hosts and you want to reduce network traffic to optimize performance.

- **Time Selection Partitioning (New)**

---

The SAP HANA database offers a special time selection partitioning scheme, also called aging. Time selection or aging allows application data to be horizontally partitioned into different temperatures like hot and cold. This improves the performance of large tables as old data can be moved to an aging partition.

## Related Information

[SAP HANA Administration Guide](#)

[SAP HANA Master Guide](#)

## 7.4 Data Provisioning

### 7.4.1 Smart Data Access

1. **Support of virtual tables in calculation view definitions.** When you create a calculation view, you can add virtual tables as data sources. As a result, a virtual table can also be referenced by calculation scenarios. The support for adding virtual tables in the calculation view was also added to SAP HANA Studio. Some optimizations, such as push down of filters, are also supported.
2. **New data sources (Oracle and Microsoft SQL Server for SQL Server 2012).** New remote data sources have been added to SAP HANA SDA. These data sources are Oracle Database 12c and Microsoft SQL Server version 11 for SQL Server 2012.
3. **Support of inserts / updates / deletes on virtual tables (with limitations).** Inserted data is transferred to the remote database on-the-fly. It is updated transactionally and deleted transactionally from the remote database. Insert/Update/Delete support is provided for the supported data sources.
4. **Support of BLOBs (Binary Large Object) and CLOBs (Character Large Object) as virtual columns data types.** You can add virtual tables that contain BLOBs or CLOBs.
5. **Support for the generic adapter framework.** You can add new data sources using the generic adapter framework provided. The generic adapter framework supports ODBC-based access only.
6. **SDA install check tool.** This tool verifies that the SDA installation is installed correctly. It verifies that the .odbc file driver installation and driver installation paths are correct and recommends solutions to any encountered errors.
7. **SAP Sybase Event Stream Processor (ESP) 5.1 SP04.** You can use it as a potential data source. You can access the content of an ESP window using SQL queries.
8. **Remote Caching on Hive.** This tool enables result caches in Hive for queries on low-velocity data, avoiding repeated Map-Reduce execution and minimizing response time.



## 7.5 Development

### 7.5.1 SAP HANA Extended Application Services (New and Changed)

SAP HANA Extended Application Services (SAP HANA XS) provides applications and application developers with access to the SAP HANA database using a consumption model that is exposed via HTTP.

In addition to providing application-specific consumption models, SAP HANA XS also hosts system services that are part of the SAP HANA database, for example: search services and a built-in Web server that provides access to static content stored in the SAP HANA repository. SAP HANA XS includes the following updates and additions:

- Core Data Services (changed)
- SAP HANA Repository (changed)
- Server-side JavaScript applications (changed)
- OData support (changed)
- Content Lifecycle Management (changed)
- Browser-based Integrated Development Environment (IDE) (changed)
- SAP HANA Development Perspective (changed)
- SAP HANA Change Management (new)

#### Core Data Services (Changed)

Core data services (CDS) is a new infrastructure for defining and consuming semantically rich data models in SAP HANA. Using a data definition language (DDL), a query language (QL), and an expression language (EL), CDS is envisioned to encompass write operations, transaction semantics, constraints, and more. The model described in CDS enables you to use the Data Definition Language to define the objects that make up the data-persistence model. You can save the data-persistence object definition as a design-time object that you manage in the SAP HANA repository and activate when necessary.

#### Note

Although currently limited in scope, CDS will become the “Data Dictionary” for SAP HANA native development in the future. CDS provided an alternative to the `.hdbtable` syntax for table definition.

The CDS syntax has been expanded to include the following new elements:

- Associations define relationships between CDS entities (tables). Note that associations have not yet been integrated into the catalog/SQL but can be referenced when defining views within the same CDS object.
- The definition of SQL views. Views defined in CDS can utilize the defined associations between entities

A graphical representation of the CDS documents is now available. With the CDS Graphical Editor you can displays a graphical view of CDS entities and their associations. Note that the graphical mode is read-only; you

can only make changes to the CDS documents in the source-code editor. It is possible to navigate to the source-code editor directly from the graphical editor.

## SAP HANA Repository (Changed)

The SAP HANA studio provides direct and easy access to the SAP HANA repository, where you can browse the design-time related objects stored in the repository. The repository integration also enables you to use context-sensitive menus in the SAP HANA studio to perform all the most regularly used commands to maintain and manage repository objects, for example: maintain delivery units; create, commit, activate packages and package content; create development workspaces; create, share, and import application projects.

### Note

Dependencies on the command-line tool `regi` and the SAP HANA client have been removed, which simplifies installation and setup. In SAP HANA studio, the [SAP HANA Repository](#) view and browser no longer use the `regi` CLI for operations such as check out, commit, activate, and so on.

The following improvements to interaction with the Repository are now visible:

- Improved performance by batching operations;
- Better tolerance for high-latency connections between SAP HANA studio and the SAP HANA server
- Dependencies during activation are considered for operations that involve multiple objects

The following additions and improvements have also been made to the [SAP HANA Repositories](#) browser in the SAP HANA studio's [SAP HANA Development](#) perspective:

- Edit the contents of a package directly in the Repository browser
- Remove artifacts from the client: undo a check-out operation without deleting content in the Repository
- Regenerate: force runtime regeneration of artifacts without the need to go through the activation process
- Content deletion: improved handling of content deletion when using the activation option in the Repository browser

## OData Support (Changed)

In SAP HANA XS, the persistence model (for example, tables, views and stored procedures) is mapped to the consumption model that is exposed to clients - the applications you write to extract data from the SAP HANA database. You can map the persistence and consumption models using OData, a resource-based Web protocol for querying and updating data. An OData application running in SAP HANA XS is used to provide the consumption model for client applications exchanging Odata queries with the SAP HANA database

- Support for validation and modification exits using XS JavaScript
- Annotations, for example, `sap:label`, `sap:unit`, `sap:text`, are available for use with texts for analytic views
- Associations between parameterized CalcViews
- Access to translatable parts of arbitrary runtime objects - support for translatable texts

---

## Application Lifecycle Management (Changed)

SAP HANA XS includes new and extended features that enable you to manage the application lifecycle. The new features include:

- Delivery Unit Dependency Viewer
- Enhanced Create Application Wizard
- Tool support for transport of SAP HANA Changes (Change Management)
- Transport of SAP HANA products (all relevant Delivery Units and product definition)
- Improved system management (without additional logon)
- Object preview during plain file import
- Easier assignment for packages to delivery units
- Application Lifecycle Management screens integration into SAP HANA studio

## Browser-Based Integrated Development Environments (Changed)

SAP HANA XS provides a Web-based development tool which you can use for development tasks, for example, creating and editing development objects, without the need for SAP HANA studio. The new Web-based Development Workbench merges the features included in the SAP HANA IDE (Integrated Development Environment) lite and the SAP HANA Web-Based Development Workbench. The new tool provides the following subtools:

- Editor  
Includes a browser based IDE for the lightweight creation and editing of development objects and debugging activities
- Catalog  
Provides access to the SAP HANA catalog enables you to view tables, views, procedures, functions, etc and their content.
- Security  
Provides access to the details of users and user roles. You can also assign roles to users and perform basic user-administration tasks.
- Trace  
Provides access to the developer-centric trace files on the SAP HANA server, for example, for the XS Engine and the Index Server.

## SAP HANA Development Perspective (New and Changed)

In the SAP HANA studio, the *SAP HANA Development Perspective* has been improved with the following features:

- Native SAP HANA repository interface:
  - Improved performance by batching operations;
  - Better tolerance for high-latency connections between SAP HANA studio and the SAP HANA server
  - Dependencies during activation are considered for operations that involve multiple objects

- Repository Browser Enhancements:
  - Edit the contents of a package directly in the Repository browser
  - Remove artifacts from the client: undo a check-out operation without deleting content in the Repository
  - Regenerate: force runtime regeneration of artifacts without the need to go through the activation process
  - Content deletion: improved handling of content deletion when using the activation option in the Repository browser
- Synchronization View:
  - Synchronization tools: the SAP HANA Repository synchronization tools have been integrated with the standard Eclipse synchronization tool
  - Pending deletions: you can view any pending deletions on the server even after the content is no longer visible on the client
  - Differences: compare the differences between local client-side content (in the SAP HANA Repository workspace) and remote server-side content (in the SAP HANA Repository)
- Project Explorer
 

The *Project Explorer* view includes the following enhancements:

  - Projects now contain both *Catalog* and *Repository Content* nodes
  - Options have been added to the context-sensitive *Team* menu, for example: *Remove from Client*, *Activate All...*, *Show in Synchronize View*
- New Artifact Templates
 

New wizards enable more streamlined file creation and enforce mandatory file-name conventions. During application development, you can now create SAP HANA XS artifacts such as application descriptors (for example, `.xsapp`, `.xsaccess`, `.xsprivileges`), or SAP HANA XS services such as `.xsodata` and `.xsjs` with the help of a wizard. For database development, you can use similar wizards to create design-time artifacts such as tables, schemas, and sequences (for example, `.hdbtable`, `.hdbsequence`, `.hdbschema`) as well as table-import configurations (`.hdbti`).
- Run Artifacts from the Studio
 

Two additional options are now available in the *Run As* context menu of the *Project Explorer* view. You can now run XSJS and OData services directly from the *Project Explorer* and display static HTML pages, too.
- Inactive Testing:
 

Developers can now execute the inactive version of of an XSJS or XS OData (`xsodata`) service as well as XSJS libraries (`xsjslib`), or any static Web content. This improves support for multiple developers working on the same content at the same time by enabling them to test their local changes.

#### Note

This feature only works when the SAP HANA server is running in developer mode (using the “developer\_mode” parameter)

and a cookie is set to the name of the Repository workspace you are using.

- SAP HANA Text Editor
  - Generic text editor for all textual based SAP HANA artifacts without their own specific editor
  - Default mapping in SAP HANA studio now uses this editor
  - Always displays the following information in the editor title bar: SAP HANA system ID, the editing user, the host name of the SAP HANA server, and SAP HANA instance number
- Mass Activation

---

A new activation dialog displays all inactive objects across all projects for the same Repository workspace. The activation option is available in the context-sensitive menu ► [Team](#) ► [Activate All](#) ►.

- CDS Graphical Editor

A graphical representation of the CDS documents is now available, which displays a graphical view of CDS entities and their associations. Graphical mode is read-only; you can only make changes to the CDS documents in the source-code editor. It is possible to navigate to the source-code editor directly from the graphical editor.

- JS Lint Setting

Access to the JS Lint setting has been moved to: ► [Window](#) ► [Preferences](#) ► [SAP HANA](#) ► [Application Development](#) ► [JS Lint](#) ►

## SAP HANA Change Management (New)

SAP HANA SPS 07 includes a new change management feature that enables developers to track changes to repository objects. Change Management provides the infrastructure for tracked development. When a system is configured to work with Change Management, the activation of a repository object prompts the developer to assign it to a container or *Change*. This allows a developer or a development team to work on a development object or artifact and release the change only when the object is ready to be transported to the test system. This provides more precise control over which objects are transported from the development system. An object's change must be released in order to be included in the export in which the delivery unit containing the object is transported. This enables the creation of a delivery unit (DU) that is composed of only released objects.

## Related Information

[SAP HANA Developer Guide](#)

## 7.5.2 SAP HANA Modeler (New and Changed)

As of SAP HANA SPS 07, the SAP HANA Model Editor environment provides the following new and changed capabilities.

### Overall Model Editor Enhancements

- The semantic node now allows to manage semantic type information of attributes and measures.
- Restricted and calculated columns definitions can be opened from the semantic node.
- The order of attributes is preserved in the semantic node.
- External views are supported as value help references in variables and input parameter.

- Input parameters can be used and are selectable as filter values in data foundation nodes.
- The expression editor used for filter and calculated columns now supports auto completion for columns, functions and function arguments, input parameters and so on and indicates data type of column.
- Column names and description can be shown in full length in the details pane of nodes.
- Model validation rules have been reduced and simplified.
- The editor now supports where-used analysis for columns from the semantic node and the output pane column list.
- Renaming of columns supports propagation of new name up to the semantic node of the model.
- Added columns allow propagation as new columns up to the semantic node of the model.
- A new dialog for editing join properties.
- Unit of measure in input parameters.
- Data Preview with enhanced query generation for analysis preview and option to open the SQLEditor with a default query example.

## Calculation View Enhancements

- The scenario panel of calculation view now supports layout resizing and zoom.
- Nodes in the scenario panel now indicate join type, join cardinality, and filter indicators for enhanced model insight.
- The rearrangement of nodes capabilities have been enhanced to support drop of new nodes on top of object references within existing nodes.
- The calculation view introduces a new star join-node for analytic-view like multi-dimension join with fact data.

## Productivity and Workflow Enhancements


- Loading of referenced objects is handled in background for faster opening performance.
- SQLEditor can be enabled from content node in the SAP HANA Systems view.
- Copy paste is enabled on objects type folder.
- New Domain entry for Transport management in Package Dialog.
- Keyboard Navigation has been further enhanced and Undo/Redo is enabled for Model editor actions.
- Referenced models can be opened from the SAP HANA Studio where-used list.

## Decision Table Enhancements

- Integration of Decision Table with the team provider in the SAP HANA Development perspective.
- Decision Table also opens in the similar editor as that of the three information views – Analytic, Attribute, and Calculation view.

---

## Manage connections for selective import of metadata

This feature enables users to create and edit connections/data-stores of type SAP Applications on SAP Business Objects Data Services repository. This is an optional feature on top of SAP HANA Studio and once installed extends the current import metadata functionality with this additional capability. The users can always create the Datastores using Data Services designer and use them in selective import of metadata wizard, which is a preferred way. For more information, see SAP Note [1942414](#) .

## Other Enhancements

- Support for generation of attributes views from BW Info Objects.
- Support for validity in generated analytic privileges.
- Auto documentation enhancements.

## 7.5.3 SAP HANA SQL Reference (New and Changed)

As of SAP HANA SPS 07, the SAP HANA database provides the following new and changed SQL features.

### New SQL Statements

#### Data Definition

- **CREATE DATABASE**  
Creates a database.
- **CREATE EXTENDED STORAGE**  
Defines an external Sybase IQ database to be used to transparently archive and query data stored in extended tables.
- **DROP EXTENDED STORAGE**  
Removes an existing extended storage configuration from the SAP HANA database.

#### System Management

- **ALTER SYSTEM CLEAR AUDIT LOG**  
Deletes old audit data from the SAP HANA database audit table.
- **ALTER SYSTEM RECOMPILE SQL PLAN CACHE ENTRY**  
Invalidates a specific SQL plan cache entry forcing it to be recompiled during the next statement execution.

## New SQL Functions

### DateTime

- **ADD\_WORKDAYS**  
Computes a result date by adding a number of workdays to a starting date.
- **WORKDAYS\_BETWEEN**  
Computes the number of workdays between a start date and an end date.

### Miscellaneous

- **CONVERT\_CURRENCY**  
Applies a unit conversion to input table <var\_table> and returns the converted values.

#### Note

This function is a SQL representation of the SQLScript function CE\_CONVERSION.

- **CURRENT\_TRANSACTION\_ISOLATION\_LEVEL**  
Returns a string containing the current transaction isolation level.
- **GROUPING**  
Used with GROUPING SETS/ROLLUP/CUBE that return multiple levels of aggregations in a single result set.
- **HASH\_SHA256**  
Returns the hash value of concatenated arguments using SHA256 algorithm.

### Number

- **BITSET**  
Sets bits in a varbinary number.
- **BITUNSET**  
Unsets bits in a varbinary number.

### String

- **BINTOSTR**  
Converts all characters in a string to a CESU-8 encoded string.
- **STRTOBIN**  
Converts all characters in a string to a specified binary encoded codepage

## Changed SQL Statements

### Access Control

- **ALTER USER**  
ENABLE/DISABLE PASSWORD LIFETIME option added for lifetime check management.
- **CREATE USER**  
<validity\_specification> for the created user can now use FROM NOW and UNTIL FOREVER keywords.
- **GRANT**  
New privileges added:
  - **AUDIT OPERATOR** - Allows execution of the auditing-related commands.



- CREATE R SCRIPT - Allows creation of R language script.

## Data Definition

- ALTER TABLE  
ADD/DROP/MOVE REPLICA - Management of table replicas. See CREATE TABLE below.  
USING EXTENDED STORAGE clause added for management of extended storage tables.
- CREATE AUDIT POLICY  
<actions\_for\_user\_clause> now has EXCEPT option to enable an audit policy for all users except a names set of users.
- CREATE FULLTEXT INDEX  
TOKEN SEPARATOR fulltext parameter added. Allows definition of ASCII characters as token separators.  
TEXT ANALYSIS parameter added - Enables text analysis capabilities on an indexed column.
- CREATE TABLE  
Group option added - Allows specification of TYPE, SUBTYPE and NAME for groups.  
REPLICA AT - Allows scale-out by adding replicated(duplicated) tables in other SAP HANA nodes. This enables the following:
  - Load Balancing - distributing a heavy application load.
  - Join Query performance optimization -providing more localized data access inside a particular index server.  
USING EXTENDED STORAGE option added - allows creation of tables with row-level versioning.
- CREATE TRIGGER  
BINTEXT data type added.

## Data Import Export

- IMPORT  
RENAME SCHEMA option added allows renaming of a schema during import.  
Details of the #IMPORT\_RESULT temporary table added that can be used to track the status of imported objects.  
FAIL ON INVALID DATA option added - When specified the IMPORT command will fail unless all the entries have imported successfully.

## Data Manipulation

- SELECT  
WITH directive added - specifies an output of the subquery to be stored in temporary named result set.

## Procedural

- CREATE TYPE  
BINTEXT datatype added.

## System Management

- ALTER SYSTEM CLEAR TRACES  
WITH BACKUP option added - compresses and saves trace files instead of removing them.

## Transaction Management

- SET TRANSACTION  
LOCK WAIT TIMEOUT option added - configures a time limit for how long TABLE LOCK or RECORD LOCK will wait when trying to obtain a lock.

## 7.5.4 SAP HANA Spatial Reference (New)

*Spatial data* is data that describes the position, shape, and orientation of objects in a defined space. Spatial data in SAP HANA is represented as geometries in the form of points, curves (line strings and strings of circular arcs), and polygons. This data can be represented in SQL and presented in SAP HANA by a multi-layered spatial engine, which supports spatial columns, spatial access methods, and various spatial reference systems. With these enhanced Graphic Information System (GIS) features, the SAP HANA platform now provides a common database for storing your business data, as well as information such as geographic locations, routing information, and shape data.

### Related Information

[SAP HANA Spatial Reference](#)

## 7.5.5 SAP HANA System Views (New and Changed)

As of SAP HANA SPS 07, the SAP HANA database provides the following new and changed system views.

### New System Views:

- ACCESSIBLE\_VIEWS
- AFL\_FUNCTION\_PROPERTIES
- AFL\_TEXTS
- AUDIT\_LOG
- EFFECTIVE\_STRUCTURED\_PRIVILEGES
- ELEMENT\_TYPES
- EPM\_MODELS
- EPM\_QUERY\_SOURCES
- M\_ACTIVE\_STATEMENTS
- M\_CE\_CALCSCENARIOS\_OVERVIEW
- M\_EPM\_SESSIONS
- M\_JOBEXECUTORS
- M\_JOBEXECUTORS\_RESET
- M\_KERNEL\_PROFILER
- M\_SERVICE\_THREAD\_SAMPLES
- M\_SQL\_CLIENT\_NETWORK\_IO
- M\_TEMPORARY\_JOIN\_CONDITIONS
- M\_TEMPORARY\_JOIN\_CONSTRAINTS
- M\_TEMPORARY\_KEY\_FIGURES
- ST\_GEOMETRY\_COLUMNS
- ST\_SPATIAL\_REFERENCE\_SYSTEMS
- ST\_UNITS\_OF\_MEASURE
- TABLE\_REPLICAS

## Sampling Session Monitor – access via system view M\_SERVICE\_THREAD\_SAMPLES

Provide thread sampling system to allow historic workload analysis on different levels of granularity like application, user, statement.

## Improved Statistic Server Historization

Adding application information to historized blocked transactions

## Capture Client Network I/O Statistics

- Add network time to client and transferred amount of data (bytes)
- New monitoring view for "M\_SQL\_CLIENT\_NETWORK\_IO"
- M\_SQL\_CLIENT\_NETWORK\_IO can be joined with Expensive Statements

## In-memory capturing of expensive statements

- The ring buffer for M\_EXPENSIVE\_STATEMENTS is active per default and replaces the former trace files
- Two new parameters were implemented in the global.ini section expensive\_statement

## Statistics Tables

Information about lock statistics is now collected in the following tables:

- HOST\_OBJECT\_LOCK\_STATISTICS
- HOST\_OBJECT\_LOCKS
- HOST\_RECORD\_LOCKS

The table HOST\_BLOCKED\_TRANSACTIONS has been enhanced to include connection and application information.

## Related Information

[SAP HANA SQL and System Views Reference](#)

## 7.5.6 SAP HANA SQLScript Editor (New and Changed)

As of SAP HANA SPS 07, the following new features are available:

### Stored Procedure Wizard (New)

The *SQLScript Procedure* wizard has been changed to the *Stored Procedure* wizard.

You can create your procedure in two different file formats: Text (.hdbprocedure) or XML (.procedure). The XML format will be deprecated in the future. It is compatible with the Modeler procedure editor, but may not support new SQLScript features. You must use the XML format if you want to create a procedure template instance.

### Scalar Function (New)

---

This new wizard enables you to create, edit, and activate design-time scalar user-defined functions (UDF).

#### **Table Function (New)**

This new wizard enables you to create, edit, and activate design-time table user-defined functions (UDF).

### **Related Information**

[Creating and Editing Procedures](#)

[Creating Scalar and Table User-Defined Functions](#)

## **7.5.7 SAP HANA SQLScript Debugger (New and Changed)**

As of SAP HANA SPS 07, the following new features are available:

#### **Granting Authorization to Debug Procedures (Changed)**

Granting authorization to debug procedures has changed. For design-time and catalog debugging, you must grant privileges in the *Object Privileges* tab of the *Users* editor. For external debugging, you must also grant privileges in the *Object Privileges* and *Privileges on Users* tabs of the *Users* editor.

#### **Debugging Catalog Procedures (New)**

You can debug and analyze active SQLScript procedures that are in any schema of your catalog. This also includes any runtime procedures, generated procedures, procedures created in design-time, or from procedure template instances.

### **Related Information**

[Debugging Design-Time Procedures](#)

[Debugging Catalog Procedures](#)

[Debugging an External Session](#)

## **7.5.8 SAP HANA UI Integration Services (New and Changed)**

As of SAP HANA SPS 07, SAP HANA UI Integration Services provides the following new and changed capabilities:

- Enhancements of the messaging mechanism (Site Context API):
  - New `getContext` method that retrieves the context object to which widgets publish their messages.
  - New key parameter in the `subscribe` method that supports the ability to subscribe different callbacks to different messages.

- An additional end user runtime environment based on the SAPUI5 unified shell.
- An ability to configure privileges for application sites, either for a specific site or for all sites in a package and its subpackages.
- An ability to configure the entry page for SAP HANA UI Integration Services to be the SAP HANA Home page. The SAP HANA Home page displays a table listing all the sites which the user has privileges to access.
- An ability to embed widgets in application site pages without iframe elements.

## Related Information

[SAP HANA Developer Guide](#)

## 7.5.9 SAP HANA Predictive Analysis Library (New and Changed)

### New Algorithms

- **Statistics Algorithms**  
A new category in the Predictive Analysis Library which includes five functions: Univariate Statistics, Multivariate Statistics, Chi-squared Test for Fitness, Chi-squared Test for Independent, and Variance Equal Test.
- **Partition**  
A preprocessing algorithm that partitions an input dataset randomly into three disjoint subsets: training, testing, and validation. The algorithm supports random partition and stratified partition.
- **Support Vector Machine (SVM)**  
Used to produce linear or non-linear supervised learning models with the concept of support vector. The algorithm can perform support vector classification, support vector regression, and support vector ranking.
- **Forecast Smoothing**  
Used to calculate optimal parameters of a set of smoothing functions in the Predictive Analysis Library, including Single Exponential Smoothing, Double Exponential Smoothing, and Triple Exponential Smoothing.
- **Substitute Missing Values**  
Used to replace the missing values in the input data with mode, mean, or median.
- **Affinity Propagation**  
A clustering algorithm in which the number of clusters is not necessarily predetermined.
- **Agglomerate Hierarchical Clustering**  
Used to perform hierarchical clustering with the agglomerate approach, which merges the clusters with a bottom-up strategy.

---

## Enhancements to Existing Algorithms

- **Multiple Linear Regression**
  - Support of p-value for each coefficient
  - Stepwise linear regression (forward and backward only)
- **Logistic Regression**
  - Logistic regression with L1 regularization
  - Categorical support for input variable
  - Support of p-value for coefficient
- **Apriori**
  - Rules output in relational format
  - Lift as a filter for rules
  - Option to control the number of items (1 or many) on the right side
- **C4.5 Decision Tree and CHAID Decision Tree**
  - Missing value handling: missing values are now replaced by mean or mode

## Related Information

[SAP HANA Predictive Analysis Library \(PAL\)](#)

## 7.5.10 Text Analysis (New)

### New Configuration Possibilities

In previous versions, you could use configurations and dictionaries for text analysis delivered by SAP only. With SPS07, you can create and use custom configurations and custom dictionaries.

You can customize the features and options used for text analysis by creating your own configuration files. You to this using one of the following methods:

- Create a new text analysis configuration file.
- Copy one of the predefined configurations.

You can also specify your own entity types and entity names to be used with text analysis by creating custom text analysis dictionaries.

### New Language Coverage

New in the area of "Core Extraction" are the following features:

- Social media entities in Simplified Chinese and Japanese (i.e. social media topics and IDs)
- Full core entity functionality in Russian

## Related Information

[SAP HANA Developer Guide](#)

## 7.5.11 Full Text Search (New and Changed)

### New and Changed Parameters

In SAP HANA SPS07 the following changes have been made to full text index parameters:

- **TOKEN SEPARATORS**  
With this new parameter, you can specify a set of characters used for token separation. Only ASCII characters are considered.  
Default values are `\ / ; , . : - _ ( ) [ ] < > ! ? * @ + { } = " &`  
If, for example, "-" is removed from the default token separators set, a chemical formula like "CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>3</sub>" is not split into "CH<sub>3</sub>", "CH<sub>2</sub>" and "CH<sub>3</sub>". Instead, it remains as one token.
- **LANGUAGE DETECTION**  
If this parameter is changed, it only affects newly-inserted documents; that is, old documents are not preprocessed again. If you want to see an effect for already-inserted documents, you have to recreate the full text index with `DROP FULLTEXT INDEX` and `CREATE FULLTEXT INDEX`. If you are also using the parameter `FAST PREPROCESS ON`, altering the parameter `LANGUAGE DETECTION` is not allowed.
- **TEXT ANALYSIS**  
This parameter can be enabled for `TEXT` or `SHORTTEXT` columns in SPS07.
- **FLUSH AFTER DOCUMENTS** and **FLUSH EVERY MINUTES**  
Both parameters can now be used for explicit and implicit full text indexes.
- **ASYNC**  
This parameter can be enabled for `TEXT` or `SHORTTEXT` columns in SPS07

## Related Information

[SAP HANA Developer Guide](#)

## 7.5.11.1 Development

### 7.5.11.1.1 Documentation Changes

Several changes have been made to the SAP HANA Developer Guide that is provided with SAP HANA Appliance Software SPS 06:

The following new sections have been added under **Developing Applications in Web-based Environments**:

- SAP HANA IDE lite
- SAP HANA Web-based Development Workbench

#### **i** Note

These tools were available in SAP HANA Platform SPS 06, Revision 60.

## Related Information

[SAP HANA Extended Application Services \(New and Changed\) \[page 93\]](#)

[SAP HANA Developer Guide](#)

## 7.5.12 Fuzzy Search (New)

## New Features

SAP HANA SPS07 includes the following new features for Fuzzy Search:

- New search options available:
  - `interScriptMatching`: Option `interScriptMatching=on` is used to find Latin transliterations of non-Latin search terms, and vice versa.
  - `returnAll`: Option `returnAll` influences the score by returning all values of a column not matching the defined fuzzy search conditions and giving them the score 0.
- Support of client-dependent term mappings and stop words.

As ABAP applications support multiple clients, and each individual client should only see their own data, Fuzzy Search provides the option of using client-specific term mappings. To limit term mappings to the current client in ABAP, you have to create an extra view on top of your custom term mapping table (including the client information) and limit the data to the current client with a WHERE condition (`WHERE CLNT = SESSION_CONTEXT('CLIENT')`).
- The search rule set editor supports schema mapping for the definition of term mapping and stopword tables.



- 
- You can create search rule sets that references a synonym of a view. They are now independent of the real database object names.
  - New column condition 'if not Equals' for use in search rule sets.  
The rule condition 'if not equals' allows to skip a rule if the column value does not equal a given value.
  - The search rule set editor supports schema mapping.
  - Term mapping tables which were created with the ABAP DDIC can now be used.
  - You can use parameter `similarCalculationMode=substringSearch` for freestyle searches in order to combine NVARCHAR, TEXT and other columns in a single search.

## Related Information

[SAP HANA Developer Guide](#)

---

## 8 SAP HANA Platform SPS 06, Features Included in Revision 61

### 8.1 Security

#### 8.1.1 SAP HANA Security

As of SAP HANA SPS 06, Revision 61, the following new system views for verifying users' authorizations are available:

- **EFFECTIVE\_STRUCTURED\_PRIVILEGES**  
This view allows you to see which analytic privileges are applicable to a view and whether or not a user is authorized.
- **ACCESSIBLE\_VIEWS**  
This view allows you to see which views a user can access.

#### Related Information

[SAP HANA Administration Guide](#)

### 8.2 Development

#### 8.2.1 Documentation Changes

Several changes have been made to the SAP HANA Developer Guide that is provided with SAP HANA Appliance Software SPS 06:

The following new sections have been added under **Developing Applications in Web-based Environments**:

- SAP HANA IDE lite
- SAP HANA Web-based Development Workbench

#### Note

These tools were available in SAP HANA Platform SPS 06, Revision 60.

## Related Information

[SAP HANA Extended Application Services \(New and Changed\) \[page 93\]](#)

[SAP HANA Developer Guide](#)

---

# 9 SAP HANA Platform SPS 06, Features Included in Revision 60

## 9.1 Installation and Update

### 9.1.1 Documentation Changes

A number of changes have been made to the installation and update documentation set that is provided with SAP HANA SPS 06:

- SAP HANA Master Guide (changed)
  - The topic "Software Components" was changed.
  - The topic "SAP HANA Guides" was changed.  
Links to the archive containing the SAP HANA documentation for previous Support Package Stacks were added.
  - The topic "Hardware and Software Requirements" was changed.  
In a distributed landscape it is no longer necessary to manually install the SAP Host Agent on each additional host.
  - The topic "Important SAP Notes" was changed. New SAP Notes and application areas were added.
  - The topic "Technical System Landscape" was removed.
  - The section "The SAP HANA Network" was added.
  - The section "SAP HANA Data Provisioning" was added. It contains the existing section "SAP HANA Replication Technologies" and new topics for the following data provisioning methods:
    - SAP Sybase Event Stream Processor
    - SAP HANA Smart Data Access
  - In section "SAP HANA Replication Technologies", the topic "Log-Based Replication (SAP Sybase Replication Server)" was added.
  - In section "SAP HANA Replication Technologies", the topic "Comparison of Replication Methods" was enhanced. A feature table for the SAP Sybase Replication Server was added.
  - The topic "Integrating SAP HANA into Customer Landscapes" was changed. It now contains only a link to the new section "The SAP HANA Network".
  - In the topic "Modeling and Data Provisioning for ETL-Based Replication (SAP Data Services)" the links were updated.
  - The topic "Installing SAP HANA" was enhanced. Installation information was taken from the SAP HANA Server Installation Guide. Installation information for data provisioning and data replication methods were added.

- **SAP HANA Update and Configuration Guide (new)**  
This guide describes the SAP HANA lifecycle manager (HLM). The SAP HANA lifecycle manager is a tool that users can call from the Lifecycle Management perspective of the SAP HANA studio. The SAP HANA lifecycle manager includes the functions of the Software Update Manager for SAP HANA and tasks formerly performed by the on-site configuration tool.
- **SAP HANA Server Installation Guide (changed)**
  - The Guide was renamed. Its former name is SAP HANA Installation Guide with Unified Installer.
  - The description of the on-site configuration tool was removed. The tasks formerly performed by the on-site configuration tool are now performed by the SAP HANA lifecycle manager.
  - Installation information was moved from the SAP HANA Installation Guide to topic "Installing SAP HANA" in the SAP HANA Master Guide.
- **SAP HANA Automated Update Guide (removed)**  
This guide is not available for SAP HANA SPS 06. Tasks performed by the Software Update Manager for SAP HANA are described in the new SAP HANA Update and Configuration Guide.
- **SAP HANA Database - Studio Installation and Update Guide (changed)**
  - The topic "Prerequisites for Updating the SAP HANA Studio with SUM for SAP HANA" was deleted.
  - The topics "Updating the SAP HANA Studio Using an Update Site" and "Manually Setting Up the Update Site for an SAP HANA Studio Update" were added.
  - The topic "Installation or Update" was updated. The reference to the Software Update Manager (SUM) for SAP HANA was replaced with a reference to the new tool SAP HANA lifecycle manager (HLM).
  - Minor updates were made to the topics "Installing or Updating the Repository on Linux" and "Installing or Updating the Repository on Windows".
- **SAP HANA Database - Client Installation and Update Guide (changed)**  
In topic "Available Clients on Unix" a requirement for unixODBC was added.
- **SAP HANA Master Update Guide (changed)**  
The SAP HANA Master Update Guide describes the necessary steps to perform an update from SAP HANA SPS 05 to SAP HANA SPS 06. The automated update of an SAP HANA system is performed with the SAP HANA lifecycle manager (HLM).  
The appendix has been restructured.

## Related Information

[SAP HANA Master Guide](#)

[SAP HANA Update and Configuration Guide](#)

[SAP HANA Master Update Guide](#)

[SAP HANA Server Installation Guide](#)

[SAP HANA Database - Studio Installation and Update Guide](#)

[SAP HANA Database - Client Installation and Update Guide](#)

## 9.1.2 SAP HANA Lifecycle Manager (New)

The SAP HANA lifecycle manager (HLM) is a tool that users can call from the Lifecycle Management perspective of the SAP HANA studio. The SAP HANA lifecycle manager includes the functions of the Software Update Manager for SAP HANA and tasks formerly performed by the on-site configuration tool.

The tasks performed by the SAP HANA lifecycle manager are:

- Integrate SAP HANA System in Landscape
  - Configure SAP Landscape Transformation (SAP LT) Replication
  - Rename SAP HANA System
  - Register in System Landscape Directory
  - Add Solution Manager Diagnostics Agent (SMD)
  - Remove Solution Manager Diagnostics Agent (SMD)
- Administrate SAP HANA Systems
  - Add Additional Host
  - Remove Additional Host
  - Add SAP HANA System
  - Remove SAP HANA System
- Manage SAP HANA Applications Content
  - Deploy HANA Content
- Update SAP HANA System
  - Update SAP HANA Lifecycle Manager (HLM)
  - Apply Support Package Stack
  - Apply Single Support Packages
- Manage Additional SAP HANA Components
  - Add Application Functional Library (AFL)
  - Add liveCache Applications (LCApps)
  - Add SAP HANA smart data access (SDA)
- Manage Products and Transports
  - Define SAP HANA Content Products
  - Manage Transports of SAP HANA Content
- Get Additional Information
  - About SAP HANA Lifecycle Manager (HLM)

### Related Information

[SAP HANA Update and Configuration Guide](#)

[SAP HANA Developer Guide](#)

---

## 9.2 Security

### 9.2.1 SAP HANA Security

As of SAP HANA SPS 06, the following new and changed security-related features are available.

#### Authentication (changed)

- The following authentication mechanisms are now supported for HTTP(S) access (SAP HANA XS):
  - SAML 2.0
  - X.509 client certificates
- The password policy and password blacklist can now be configured in the Security editor of the SAP HANA studio.

#### User and Role Management (new and changed)

- It is now possible to configure the following additional properties for database users using the SQL statements CREATE USER or ALTER USER:
  - Validity period
  - Timezone
  - E-mail address
  - Locale

Only user administrators, that is users with the system privilege USER ADMIN can configure validity period.
- The standard role SUPPORT has been renamed SAP\_INTERNAL\_HANA\_SUPPORT to better reflect its purpose.

This role contains system privileges (for example, CATALOG READ) and object privileges (for example, SELECT on SYS schema) that allow access to certain low-level internal system views needed by SAP HANA development support in support situations. All access is read only. This role does not allow access to any customer data.
- The authorization dependency viewer is a new feature available in the SAP HANA studio.

The authorization dependency viewer visualizes the object dependency structure of stored procedures and views together with the SQL authorization status of the object owner along the dependency paths. You can use the authorization dependency viewer as a first step in troubleshooting the following authorization errors and invalid object errors for these object types:

  - NOT AUTHORIZED (258)
  - INVALIDATED VIEW (391)
  - INVALIDATED PROCEDURE (430)

- BACKUP OPERATOR is a new system privilege that allows you to implement a finer-grained separation of duties if this is necessary in your organization.  
For more information, see [SAP HANA Backup and Recovery \[page 121\]](#).
- The SAP HANA studio now supports the creation of analytic privileges with dynamic procedure-based value filters.
- The SAP HANA studio now supports the granting and revoking of application privileges.  
Developers of SAP HANA XS applications can create application privileges to authorize user and client access to their applications.
- EFFECTIVE\_ROLES is a new system view that shows all roles granted to users both directly and indirectly through other roles.  
This system view complements the system view EFFECTIVE\_PRIVILEGES.
- Client-side export and import no longer require the system privileges EXPORT and IMPORT.  
For export, only the SELECT object privilege on the database object(s) is required. For import, INSERT/UPDATE, DROP, or CREATE object privileges are required, depending on the import.

#### Note

The EXPORT and IMPORT system privileges still exist. However, they are very powerful and should only be assigned to users who need to do exports or imports that involve the file system of the server on which the SAP HANA database is running.

## Encryption (changed)

The secure store file system (SSFS) is now automatically included in each SAP HANA data backup and restored during recovery.

## Auditing (changed)

The following additional actions can be audited:

- Disconnect and cancel session
- Drop table
- Activate, import, and export repository content
- Backup lifecycle management (truncate backup catalog/delete backups)

Audit entries written to the audit trail have the following additional fields:

- Client IP Address
- Client Name
- Client Process ID
- Client Port Number



## Access Control for SAP HANA-Based Applications (new)

- Secure internal credential store

A secure internal credential store is now available in the SAP HANA database. This is an internal service that allows you to securely store the credentials required for outbound connections of SAP HANA applications. For example, in an SAP HANA smart data access scenario, in order to retrieve data, credentials are required to access a remote source.

Credentials can be set and updated by users and privileged administrators using the SQL interface.

However, access to credentials in unencrypted form is only available to native SAP HANA applications via an internal API

The following new SQL statements are available for changing and creating credentials:

```
CREATE CREDENTIAL FOR [USER <user_name>] COMPONENT <string_literal> PURPOSE  
<string_literal> TYPE <string_literal> USING <string_literal>
```

```
ALTER CREDENTIAL FOR [USER <user_name>] COMPONENT <string_literal> PURPOSE  
<string_literal> TYPE <string_literal> USING <string_literal>
```

The new system privilege CREDENTIAL ADMIN is also available.

- Access control concept for SAP HANA smart data access

SAP HANA smart data access makes it possible to connect remote data sources and to present the data contained in these data sources as if from local SAP HANA tables. This can be used, for example, in SAP Business Warehouse installations running on SAP HANA to integrate data from remote data sources.

Connections to the remote data source can be authenticated as follows:

- By one technical user credential  
All connections to the remote data source share one and the same credential for the data source.
- By multiple secondary SAP HANA user-specific credentials  
There is one credential per user per data source.

All credentials are stored securely in SAP HANA's internal credential store.

Authorization to access data in the remote data source is determined by the privileges of the database user as standard. In SAP Business Warehouse scenarios, authorization is applied in the BW layer.

The SAP HANA authorization framework has been enhanced in the following ways:

- New system privileges: CREATE REMOTE SOURCE, CREDENTIAL ADMIN
- Changed system privilege: DATA ADMIN
- New SQL object privilege: CREATE VIRTUAL TABLE
- Changed SQL object privilege: DROP

For more information, see [SAP HANA Smart Data Access \(New\) \[page 124\]](#)

## Related Information

[SAP HANA Security Guide](#)

## 9.3 System Administration

### 9.3.1 SAP HANA Administration

As of SAP HANA SPS 06, the SAP HANA studio provides the following new and changed administration and monitoring features

#### Monitoring

- To improve usability for database administrators, the user-defined filters and layout configuration applied on the several tabs in the Administration editor are automatically saved when the SAP HANA studio is closed and re-applied the next time it is opened, independently of system.  
This feature is available on the following sub-tabs of the *Performance* tab:
  - *Sessions*
  - *SQL Plan Cache*
  - *Expensive Statements Trace*
  - *Job Progress*In addition, it is available on the *System Replication* sub-tab of the *Landscape* tab.
- The *Threads* sub-tab of the *Performance* tab has been enhanced to support improved analysis of blocking situations.  
A new filter (*Group and sort*) provides a more meaningful and clear structure for analysis. In addition, a new sub-tab *Blocked Transaction* displays blocked threads and the corresponding transactions.
- The *Sessions* sub-tab of the *Performance* tab has several new columns, for example, statistics about query runtime and session DML and DDL statements are now available.
- The *Expensive Statements Trace* tab of the *Performance* tab has been enhanced to display the individual steps of statement execution in a hierarchical tree structure.
- The following new columns have been added to the SQL plan cache and are visible on the *SQL Plan Cache* sub-tab of the *Performance* tab:
  - LAST\_CONNECTION\_ID
  - TOTAL\_TABLE\_LOAD\_TIME\_DURING\_PREPARATION
  - AVG\_TABLE\_LOAD\_TIME\_DURING\_PREPARATION
  - MIN\_TABLE\_LOAD\_TIME\_DURING\_PREPARATION
  - MAX\_TABLE\_LOAD\_TIME\_DURING\_PREPARATION
  - STATEMENT\_HASH
- If you have your own SQL statements for monitoring purposes, you can now save these statements in the Administration editor for convenient repeated execution.  
Statements are saved in an XML file, which you can edit either directly on the *System Information* tab or offline on your local file system.
- The statistics server now performs the following additional checks and alerts of critical situations:
  - Savepoint duration

- This check identifies savepoint operations that have been running for a long time
  - Column-store unloads
    - This check determines how many columns in column-store tables have been unloaded from memory.
    - This can indicate performance issues.
  - Status of python trace
    - This check determines whether or not the python trace is active. The python trace can affect system performance.

## Administration of Scale-Out Systems (changed)

- The Table Distribution editor in the SAP HANA studio has been enhanced to support the following table partitioning operations:
  - Change a partitioned table into a non-partitioned table by merging all of its partitions
    - If this operation is executed on a distributed system, the operation includes ensuring that all partitions reside on the same host and that this host has sufficient memory.
  - Partition an existing non-partitioned column-store table
- The SAP HANA studio now supports internal and external host names.
  - In previous releases, SAP HANA systems were externally accessible only with their public name. For single-host systems, this is typically no issue, but for other configurations such as disaster recovery with storage replication or cloud scenarios, network accessibility using internal and external host names is required.

## Administration for High-Availability (new and changed)

- The SAP HANA studio now provides support for system replication.
  - The following administration activities are possible:
    - Performing the initial set-up, that is enabling system replication and establishing the connection between two identical systems
    - Monitoring the status of system replication to ensure that both systems are in sync
    - Triggering failover to the secondary system in the event of a disaster and failback once the primary system is available again
    - Disabling system replication
- The [Landscape](#) tab of the Administration editor has been enhanced to allow the configuration of failover groups.
  - Failover groups are used by the host auto-failover mechanism.
- Asynchronous log replication mode added to system replication, which enables disaster recovery support over longer distances.
- System replication supports near zero downtime upgrades.
- Takeover decision support is provided by the Python script `landscapeHostConfiguration.py`.
- Secondary servers can also be used for non-productive SAP HANA systems under certain conditions.

---

## Tracing (changed)

- The Python support script `fullSystemInfoDump.py` can now be executed directly from the [Diagnosis Files](#) tab of the Administration editor if there is no SQL connection to the system. Even if an SQL connection is available, it is possible to execute the script directly. This may be desirable if using the SQL procedure would overload the system. The script collects the following additional information:
  - Content from the system view `SYS.M_DATABASE_HISTORY`
  - Performance trace files (\*.tpt)
- It is now possible to display zipped diagnosis files, that is files ending with \*.gz, on the [Diagnosis Files](#) tab. The file is unzipped to a temporary file in the local SAP HANA studio workspace.
- Additional configuration options are available for the performance trace, SQL trace, and expensive statements trace.
- The display of crash dump files on the [Diagnosis Files](#) tab has been improved. A hyperlinked table of contents allows you to navigate the content more easily. To see the hyperlinks, press the **CTRL** key as you move your mouse over the entries.
- If the JDBC trace is active for system, this is now indicated in the [SAP HANA Systems](#) view.

## Persistence (new and changed)

- SAP HANA automatically creates additional files if existing files in a data volume located in an ext3 file system reach the 2 TB limit.
- Paged attributes can be activated for a column-store table meaning that SAP HANA now can read attribute structures from disk based on pages, which reduces the overhead of keeping all data in memory.
- Support for hybrid LOBs (BLOB, CLOB, NCLOB). Each LOB now has its own virtual file inside SAP HANA.

## Additional Features (new and changed)

- A new parameter `reserved_connections` is available in the `indexserver.ini` configuration file, which you can edit on the [Configuration](#) tab of the Administration editor. You can use this parameter to reserve a certain number of connections for administrative access only. When the maximum number of connections minus the number reserved connections is reached, only an administrator with the system privilege `SESSION ADMIN` can log on to the system, for example, to resolve blocking situations by canceling sessions.
- The System Landscape Directory (SLD) data supplier can now read and send lifecycle management data. It now also supports external addresses.

## Related Information

[SAP HANA Administration Guide](#)

## 9.3.2 SAP HANA Backup and Recovery

As of SAP HANA SPS 06, the following new and changed backup and recovery features are available.

### Backup Editor (changed)

The Backup editor of the SAP HANA studio now displays the following additional information:

- Last successful data backup with information on start/end time, duration, size, and throughput
- Progress information on the currently running data backup, with information on the services included in the backup

In addition, the Backup editor now features a new tab for the backup catalog. The *Backup Catalog* tab displays a list of past backups, where you can see the status of each catalog entry, as well as its key information, at a glance.

### Backup Deletion (new)

It is now possible to delete data and log backups from the backup catalog only and both from the catalog and the physical backup location. Deleting old backups may be required in order to manage your backup storage space or to fulfill regulatory deletion requirements.

You can delete backups from the *Backup Catalog* tab of the Backup editor and using SQL statements.

The following new SQL statements are available:

```
BACKUP CATALOG DELETE BACKUP_ID <backup_id> [COMPLETE]
```

```
BACKUP CATALOG DELETE ALL BEFORE BACKUP_ID <backup_id> [WITH FILE] | [WITH  
BACKINT] | [COMPLETE]
```

### Copying a Database Using Backup and Recovery (changed)

It is now possible to copy a database copy using backup and recovery for a scale-out system with  $m$  nodes to a system with  $n$  nodes ( $m > n$ ). This may be needed, for example, when you want to use a copy of your production system for tests on a smaller test system.

#### Note

If the target system has less resources, for example, less CPU and RAM, performance cannot be expected to be the same as in the source system.

---

## Splitting Data Backups into Files of Limited Size (new)

In some scenarios, data backups can become larger than the maximum permitted file size of the file system where they are to be stored. A data backup can now be split up into several parts that do not exceed the maximum file size of the given file system. A new configuration option available in the Backup editor allows you to set this maximum file size.

## Integration of Secure File System Store into Backup and Recovery (new)

The secure store file system (SSFS) is now automatically included in each SAP HANA data backup and restored during recovery.

## Backup Wizard (enhanced)

The backup wizard in the SAP HANA studio can now always be started unless the SAP HANA database is offline. If the current state of the database makes a backup impossible, an error message specifying the reason will be displayed. In some earlier revisions of SAP HANA, it was not possible to start the backup wizard if the operational status of the system in the SAP HANA Systems view was yellow.

## Log Backup Availability Check (new)

In the recovery wizard of the SAP HANA studio, there is a new option that allows you to force the system to check that all required log backups are available before the recovery starts. You can specify where the system should look for log backups: in the file system or (if applicable) in the third-party backup tool that is connected via the Backint interface.

If this option is not selected, the system will still check for the required log backups, but some time later while the recovery is already running. This may result in a significant loss of time if the complete recovery must be repeated due to missing log backups.

## System Privilege BACKUP OPERATOR (new)

BACKUP OPERATOR is a new system privilege that allows you to implement a finer-grained separation of duties if this is necessary in your organization.

A user with the system privilege BACKUP ADMIN can perform all backup-related operations, including backup deletion and configuration. A user with the system privilege BACKUP OPERATOR can only perform backups. For example, if you have automated the regular performance of backups using a Cron script, it is more secure to use a user with the privilege BACKUP OPERATOR to avoid the malicious deletion of backups.

---

## Log Mode Legacy (deprecated)

The log mode legacy will be deprecated with SPS 07. If you are still using this log mode in your SAP HANA database, make sure that you know how to convert to the log mode normal on time and adjust your schedules accordingly.

For more information, see [1823343](#) and [1645183](#).

## Related Information

[SAP HANA Administration Guide](#)

## 9.4 Data Provisioning

### 9.4.1 Unified Data Provisioning (New)

SAP HANA supports several mechanisms for data provisioning, for example, SAP HANA smart data access and the various SAP HANA data replication technologies. These mechanisms use different interfaces to define and manage the data provisioning process. As of SAP HANA SPS 06, new features are available that represent the establishment of a unified data provisioning framework. Unified data provisioning provides a set of modeling, administration and monitoring features for provisioning data into SAP HANA. The aim is to separate the modeling of the data flows used for data provisioning from the administration of actual data provisioning, independently of the data provisioning technology used.

Currently, these features support only data provisioning on the basis of replication using the SAP Landscape Transformation (LT) Replication Server.

### Data Flow Modeling (new)

A new [Data Flow](#) editor is available in the SAP HANA Development perspective of the SAP HANA studio.

When setting up the persistence model for their applications, content developers specify data-provisioning rules that indicate which data needs to be accessed. If the required data is being provisioned into SAP HANA from a source system using the SLT Replication Server, they can now also model an abstract data flow that specifies the data source and the relevant tables. For example, a data flow could specify a specific table from a data source in an SAP ERP system.

Data flows can be included in delivery units and transported between systems.

---

## Data Provisioning Administration (new)

Data flows do not result in the provisioning of data from the specified objects. You can now provision data on the basis of data flows by starting a provisioning job. This feature is available in the [Data Provisioning](#) editor of the Modeler perspective. A job associates the data flow with the actual data source and triggers provisioning.

### Related Information

[SAP HANA Administration Guide](#)

## 9.4.2 SAP HANA Smart Data Access (New)

SAP HANA smart data access enables remote data to be accessed as if they are local tables in SAP HANA, without copying the data into SAP HANA.

Not only does this capability provide operational and cost benefits, but most importantly it supports the development and deployment of the next generation of analytical applications which require the ability to access, synthesize and integrate data from multiple systems in real-time regardless of where the data is located or what systems are generating it.

Specifically, in SAP HANA, you can create virtual tables which point to remote tables in different data sources. Customers can then write SQL queries in SAP HANA, which could operate on virtual tables. The SAP HANA query processor optimizes these queries, and executes the relevant part of the query in the target database, returns the results of the query to SAP HANA, and completes the operation.

### Related Information

[SAP HANA Security Guide](#) (see "Secure Storage of Passwords in SAP HANA" and "Secure Internal Credential Store")

[SAP HANA Administration Guide](#) (see "About SAP HANA Smart Data Access")

[SAP Note 1868209](#): Additional information about SPS06 and smart data access 

[SAP Note 1868702](#): Information about installing the drivers that SAP HANA smart data access supports 

## 9.5 Development



## 9.5.1 Documentation Changes

Several changes have been made to the developer documentation set that is provided with SAP HANA Appliance Software SPS 06:

- The SAP HANA System Tables and Monitoring Views Reference and the SAP HANA SQL Reference have been merged into one document. It is renamed SAP HANA SQL and System Views References.
- The following new documents have been added:
  - SAP HANA Database - SQL Command Network Protocol
  - SAP HANA Interactive Education (SHINE)
  - SAP HANA Modeling Guide
  - SAPUI5 Reference for SAP HANA
- In addition to the existing documents, the following are now available online in SAP HANA studio:
  - SAP HANA Business Function Library (BFL)
  - SAP HANA Database – System Views Reference
  - SAP HANA Interactive Education (SHINE)
  - SAP HANA Modeling Guide
  - SAP HANA Predictive Analysis Library (PAL)
  - SAP HANA SQL Reference

### Related Information

[SAP HANA Database - SQL Command Network Protocol](#)

[SAP HANA Interactive Education \(SHINE\)](#)

[SAP HANA Modeling Guide](#)

[SAPUI5 Reference for SAP HANA](#)

## 9.5.2 SAP HANA Extended Application Services (New and Changed)

SAP HANA Extended Application Services (SAP HANA XS) provides applications and application developers with access to the SAP HANA database using a consumption model that is exposed via HTTP.

In addition to providing application-specific consumption models, SAP HANA XS also hosts system services that are part of the SAP HANA database, for example: search services and a built-in Web server that provides access to static content stored in the SAP HANA repository. SAP HANA XS includes the following updates and additions:

- Core Data Services (changed)
- SAP HANA Repository (changed)
- Server-side JavaScript applications (changed)
- OData support (changed)
- Content Lifecycle Management (changed)

- Browser-based Integrated Development Environment (IDE) (changed)
- SAP HANA Development Perspective (changed)
- SAP HANA Change Management (new)

## Core Data Services (Changed)

Core data services (CDS) is a new infrastructure for defining and consuming semantically rich data models in SAP HANA. Using a data definition language (DDL), a query language (QL), and an expression language (EL), CDS is envisioned to encompass write operations, transaction semantics, constraints, and more. The model described in CDS enables you to use the Data Definition Language to define the objects that make up the data-persistence model. You can save the data-persistence object definition as a design-time object that you manage in the SAP HANA repository and activate when necessary.

### Note

Although currently limited in scope, CDS will become the “Data Dictionary” for SAP HANA native development in the future. CDS provided an alternative to the `.hdbtable` syntax for table definition.

The CDS syntax has been expanded to include the following new elements:

- Associations define relationships between CDS entities (tables). Note that associations have not yet been integrated into the catalog/SQL but can be referenced when defining views within the same CDS object.
- The definition of SQL views. Views defined in CDS can utilize the defined associations between entities

A graphical representation of the CDS documents is now available. With the CDS Graphical Editor you can displays a graphical view of CDS entities and their associations. Note that the graphical mode is read-only; you can only make changes to the CDS documents in the source-code editor. It is possible to navigate to the source-code editor directly from the graphical editor.

## SAP HANA Repository (Changed)

The SAP HANA studio provides direct and easy access to the SAP HANA repository, where you can browse the design-time related objects stored in the repository. The repository integration also enables you to use context-sensitive menus in the SAP HANA studio to perform all the most regularly used commands to maintain and manage repository objects, for example: maintain delivery units; create, commit, activate packages and package content; create development workspaces; create, share, and import application projects.

### Note

Dependencies on the command-line tool `regi` and the SAP HANA client have been removed, which simplifies installation and setup. In SAP HANA studio, the [SAP HANA Repository](#) view and browser no longer use the `regi` CLI for operations such as check out, commit, activate, and so on.

The following improvements to interaction with the Repository are now visible:

- Improved performance by batching operations;

- Better tolerance for high-latency connections between SAP HANA studio and the SAP HANA server
- Dependencies during activation are considered for operations that involve multiple objects

The following additions and improvements have also been made to the [SAP HANA Repositories](#) browser in the SAP HANA studio's [SAP HANA Development](#) perspective:

- Edit the contents of a package directly in the Repository browser
- Remove artifacts from the client: undo a check-out operation without deleting content in the Repository
- Regenerate: force runtime regeneration of artifacts without the need to go through the activation process
- Content deletion: improved handling of content deletion when using the activation option in the Repository browser

## OData Support (Changed)

In SAP HANA XS, the persistence model (for example, tables, views and stored procedures) is mapped to the consumption model that is exposed to clients - the applications you write to extract data from the SAP HANA database. You can map the persistence and consumption models using OData, a resource-based Web protocol for querying and updating data. An OData application running in SAP HANA XS is used to provide the consumption model for client applications exchanging Odata queries with the SAP HANA database

- Support for validation and modification exits using XS JavaScript
- Annotations, for example, sap:label, sap:unit, sap:text, are available for use with texts for analytic views
- Associations between parameterized CalcViews
- Access to translatable parts of arbitrary runtime objects - support for translatable texts

## Application Lifecycle Management (Changed)

SAP HANA XS includes new and extended features that enable you to manage the application lifecycle. The new features include:

- Delivery Unit Dependency Viewer
- Enhanced Create Application Wizard
- Tool support for transport of SAP HANA Changes (Change Management)
- Transport of SAP HANA products (all relevant Delivery Units and product definition)
- Improved system management (without additional logon)
- Object preview during plain file import
- Easier assignment for packages to delivery units
- Application Lifecycle Management screens integration into SAP HANA studio

## Browser-Based Integrated Development Environments (Changed)

SAP HANA XS provides a Web-based development tool which you can use for development tasks, for example, creating and editing development objects, without the need for SAP HANA studio. The new Web-based

---

Development Workbench merges the features included in the SAP HANA IDE (Integrated Development Environment) lite and the SAP HANA Web-Based Development Workbench. The new tool provides the following subtools:

- **Editor**  
Includes a browser based IDE for the lightweight creation and editing of development objects and debugging activities
- **Catalog**  
Provides access to the SAP HANA catalog enables you to view tables, views, procedures, functions, etc and their content.
- **Security**  
Provides access to the details of users and user roles. You can also assign roles to users and perform basic user-administration tasks.
- **Trace**  
Provides access to the developer-centric trace files on the SAP HANA server, for example, for the XS Engine and the Index Server.

## SAP HANA Development Perspective (New and Changed)

In the SAP HANA studio, the *SAP HANA Development Perspective* has been improved with the following features:

- **Native SAP HANA repository interface:**
  - Improved performance by batching operations;
  - Better tolerance for high-latency connections between SAP HANA studio and the SAP HANA server
  - Dependencies during activation are considered for operations that involve multiple objects
- **Repository Browser Enhancements:**
  - Edit the contents of a package directly in the Repository browser
  - Remove artifacts from the client: undo a check-out operation without deleting content in the Repository
  - Regenerate: force runtime regeneration of artifacts without the need to go through the activation process
  - Content deletion: improved handling of content deletion when using the activation option in the Repository browser
- **Synchronization View:**
  - Synchronization tools: the SAP HANA Repository synchronization tools have been integrated with the standard Eclipse synchronization tool
  - Pending deletions: you can view any pending deletions on the server even after the content is no longer visible on the client
  - Differences: compare the differences between local client-side content (in the SAP HANA Repository workspace) and remote server-side content (in the SAP HANA Repository)
- **Project Explorer**  
The *Project Explorer* view includes the following enhancements:
  - Projects now contain both *Catalog* and *Repository Content* nodes
  - Options have been added to the context-sensitive *Team* menu, for example: *Remove from Client*, *Activate All...*, *Show in Synchronize View*

- **New Artifact Templates**  
New wizards enable more streamlined file creation and enforce mandatory file-name conventions. During application development, you can now create SAP HANA XS artifacts such as application descriptors (for example, `.xsapp`, `.xsaccess`, `.xsprivileges`), or SAP HANA XS services such as `.xsodata` and `.xsjs` with the help of a wizard. For database development, you can use similar wizards to create design-time artifacts such as tables, schemas, and sequences (for example, `.hdbtable`, `.hdbsequence`, `.hdbschema`) as well as table-import configurations (`.hdbti`).
- **Run Artifacts from the Studio**  
Two additional options are now available in the *Run As* context menu of the *Project Explorer* view. You can now run XSJS and OData services directly from the *Project Explorer* and display static HTML pages, too.
- **Inactive Testing:**  
Developers can now execute the inactive version of of an XSJS or XS OData (`xsodata`) service as well as XSJS libraries (`xsjslib`), or any static Web content. This improves support for multiple developers working on the same content at the same time by enabling them to test their local changes.

#### Note

This feature only works when the SAP HANA server is running in developer mode (using the “developer\_mode” parameter)

and a cookie is set to the name of the Repository workspace you are using.

- **SAP HANA Text Editor**
  - Generic text editor for all textual based SAP HANA artifacts without their own specific editor
  - Default mapping in SAP HANA studio now uses this editor
  - Always displays the following information in the editor title bar: SAP HANA system ID, the editing user, the host name of the SAP HANA server, and SAP HANA instance number
- **Mass Activation**  
A new activation dialog displays all inactive objects across all projects for the same Repository workspace. The activation option is available in the context-sensitive menu ► *Team* ► *Activate All* ►.
- **CDS Graphical Editor**  
A graphical representation of the CDS documents is now available, which displays a graphical view of CDS entities and their associations. Graphical mode is read-only; you can only make changes to the CDS documents in the source-code editor. It is possible to navigate to the source-code editor directly from the graphical editor.
- **JS Lint Setting**  
Access to the JS Lint setting has been moved to: ► *Window* ► *Preferences* ► *SAP HANA* ► *Application Development* ► *JS Lint* ►

## SAP HANA Change Management (New)

SAP HANA SPS 07 includes a new change management feature that enables developers to track changes to repository objects. Change Management provides the infrastructure for tracked development. When a system is configured to work with Change Management, the activation of a repository object prompts the developer to assign it to a container or *Change*. This allows a developer or a development team to work on a development object or artifact and release the change only when the object is ready to be transported to the test system. This provides more precise control over which objects are transported from the development system. An

---

object's change must be released in order to be included in the export in which the delivery unit containing the object is transported. This enables the creation of a delivery unit (DU) that is composed of only released objects.

## Related Information

[SAP HANA Developer Guide](#)

### 9.5.3 SAP HANA Modeler (New and Changed)

As of SAP HANA SPS 06, the SAP HANA modeler provides the following new and changed features.

#### NEW

- One editor for all the three information views - calculation view also opens in the same editor as that of the attribute view and analytic view. Also, the creation wizard for all the three view types is same.
- Integration of modeler objects that is, attribute views, analytic views, calculation views, and analytic privileges with the team Provider in the SAP HANA Development perspective.  
To create any of the above mentioned objects you do not have to switch to the Modeler perspective. You can create or edit these objects in the Modeler view editor which earlier used to open in the text editor.
- Dynamic Join - in a multi-column join scenario you can specify a join as dynamic join where the elements of a join condition between two data sources are defined dynamically based on the fields requested by the client query.
- Display Folder - for Multidimensional Reporting Clients, display folder can be defined to better structure measures.
- Dynamic Analytic Privilege - you can create an analytic privilege such that the user specific filter conditions are specified dynamically at runtime, for example, by querying designated tables or views.
- Change authoring schema - you can change the authoring schema references in a view.
- Support to resolve missing object inconsistencies - you can now open the models in case of missing objects or element references with the error markers. These conflicts with error markers in red color can now be easily resolved.
- Package configuration for imported BW objects - you can place the generated objects resulting from the BW import into a user-defined package.
- Support for Empty Cardinality - the join cardinality specification in joins is no longer mandatory. The SAP HANA engine will try to determine the correct cardinality before the query is executed to select an optimized execution path.
- Support for EMF-based Model 3-way merge / conflict resolution of multiple instances of the same model from the SAP HANA development perspective.
- Support for formulas in decision tables - formulas can be defined as calculated attributes using other attributes, parameters or existing SQL functions.
- Support for non-mutually exclusive conditions - a new decision table property is introduced. When the Mutually Exclusive property is set to false, decision tables support non-mutually exclusive conditions.

- Support for complex expressions – conditions and actions in the decision table now support complex expressions.
- New expression editor in SPS06 to edit complex expressions in the decision table action and condition cells in place of an old text editor.

## CHANGED

- Enhancements made to the hierarchies with the support for Order By, Sort Direction for Level Hierarchy, and Orphan Nodes, Multiple Parent, Add a Root Node advanced options for both Level and Parent Child Hierarchies.
- In the Modeler perspective, you can show all the object types in the SAP HANA Systems view by setting the preferences.
- Enabled deletion of load and replication status entries from the SAP HANA status tables.
- Enabled copy-paste functionality for Calculated Column, Restricted Column, and Input Parameters.
- Enhancements made to the Variables and Input Parameters
  - Selected attributes in variables are automatically defaulted as applied for the variable filter
  - Variables can be directly created from the details area of the semantic node where the variable name is shown along with the filter icon
  - Special default values are now supported and can be authored via an expression editor

## Related Information

[SAP HANA Modeling Guide](#)  
[SAP HANA Developer Guide](#)

### 9.5.4 SAP HANA SQLScript Editor (New)

As of SAP HANA SPS 06, the following new features are available:

#### New Wizard

The [New](#) wizard has been added which enables you to create a procedure. You can also create a procedure based on a procedure template by choosing the [Advanced](#) option.

#### Procedure Template

The [Template Script](#) editor has been added, which enables you to create a script with predefined placeholders for objects such as tables, views and columns. The procedure template enables you to create procedures that contain the same script, but with different values.

#### Procedure Template Instance

The [Procedure Template Instance](#) editor has been added, which enables you to create a procedure template instance based on a procedure template. It contains the same procedure script and uses specific values for

---

the predefined placeholders in the script. Procedure template instances are coupled with the procedure template, which means any changes that are made to the template are also applied to the template instances.

## Related Information

[Creating and Editing Procedures](#)

[Creating Procedure Templates](#)

[Creating Procedure Templates Instances](#)

## 9.5.5 SAP HANA SQLScript Debugger (New and Changed)

As of SAP HANA SPS 06, the following new features are available:

Debug Configuration Wizard (Changed) and Debugging an External Session (New)

The *Debug Configuration* wizard allows you to debug a procedure in a new session or to connect to an external session which executes the procedure. When debugging a procedure in a new session, a list of the input parameters and their types is displayed for your procedures, and you can set a value for parameter.

You can debug and analyze procedures that are executed by an external application using a connection ID, the HANA user, or the HANA user and the application user that your external application uses to connect to the SAP HANA database and to call procedures.

You can also select what you want to compile in debug mode.

## Related Information

[Debugging Procedures](#)

[Debugging an External Session](#)

## 9.5.6 SAP HANA SQLScript (New)

As of SAP HANA SPS 06, the SAP HANA database provides the following new and changed SQLScript features.

- ARRAY - Support write operations on table variables, index wise access to table variables
- APPLY\_FILTER - Dynamic filter or condition tables.
- Column view parameter binding
- Scalar user defined functions - support for scalar variable assignment in user defined functions using SQL expressions.



## 9.5.7 SAP HANA Application Function Modeler (New)

The SAP HANA Application Function Modeler is a new graphical editor in SAP HANA Studio for developing procedures using the application functions in the SAP HANA Predictive Analysis Library and Business Function Library. With the editor, you can add and configure application functions and generate procedures in an intuitive manner, without the need to write any SQLScript code. The generated procedures are stored as repository objects and can easily be reused as part of the development workflow.

## 9.5.8 UI Development Toolkit for HTML5 (New and Enhanced)

This release note provides an overview of new functions of the UI development toolkit for HTML5 (SAPUI5) for version 1.12 in comparison to 1.10.

- SAPUI5 runtime offers the following new or enhanced functions:
  - Extended binding syntax for declarative views including calculated fields, formatters and data types
  - New API for device and feature detection and media query support
  - Quick theming support using UI theme designer
  - New `ResponsiveLayout` that can be used now as layout for the form
  - New controls like `NoteTaker`, `DateRangeSlider` and `SplitButton`
  - All charts in `sap.viz` library support basic touch gestures on touch enabled devices
  - `Shell` control offers a new property `designType` to switch the design of the `Shell`
- SAPUI5 Tools offers the following new and enhanced functions:
  - New view type HTML View
  - Support for new libraries `suite-ui-commons` and `ui5.mobile-ext`
  - Some smaller improvements
- SAPUI5 Mobile contains smaller extensions of existing controls and several bug fixes.

### More Information

For a detailed list of all features and also bug fixes, see: [http://<host>:<port>/sap/public/bc/ui5\\_ui5/demokit/#docs/guide/ReleaseNotes.html](http://<host>:<port>/sap/public/bc/ui5_ui5/demokit/#docs/guide/ReleaseNotes.html).

#### Note

Replace `<host>` and `<port>` with the respective host name and port number of your SAPNetWeaver application server.

---

## 9.5.9 SAP HANA UI Integration Services (Changed)

As of SAP HANA SPS 06, SAP HANA UI Integration Services is enhanced by the following capabilities:

- Design environment is provided in the embedded browser of the SAP HANA studio
- GadgetPrefs API provides an ability to retrieve saved widget properties as specific data types
- Ability to customize properties and display options of a widget in an application site
- Ability to organize application site pages in two levels

### Related Information

[SAP HANA Developer Guide](#)

## 9.5.10 Full Text Search (New)

### Parameter MIME TYPE

A new parameter `MIME TYPE` has been introduced for the full text index.

This specifies the default MIME type used for preprocessing. You can specify the MIME type `application/pdf` if your table contains only pdf content for example.

You can find a list of supported MIME types in the `SYS.M_TEXT_ANALYSIS_MIME_TYPES` view.

### Related Information

[SAP HANA Developer Guide](#)

## 9.5.11 Fuzzy Search (New and Changed)

### New

SAP HANA SPS06 includes the following features for Fuzzy Search:

- Support for compound words  
Compound words are word combinations written without a blank or in some languages combinations of more than two words. To enhance the search, you can specify the composition and decomposition of terms for text types and in search rule sets.  
The new search options for compound words are `composeWords`, `decomposeWords`, `compoundWordWeight`.
- Support for column conditions  
Column conditions define what happens when an input column is empty or missing.
- The Search rule set editor supports drag & drop, to add a view to a search rule set for example.
- Search rule sets can now be based on SQL views and Column Views (of type join).
- Information views are available for search rule sets.
- Predefined columns: New output column `_RULE_NUMBER` available
- New parameter `offset` for the `EXECUTE_SEARCH_RULE_SET` function to get paged result sets.
- It is now possible to select the columns returned by the `EXECUTE_SEARCH_RULE_SET` function.
- Additional filter conditions are available to limit the search to a subset of the view contents.
- New search options available:  
`phraseCheckFactor`: Defines the score of a search when the terms in a text field are not in the same order as in the user input.  
`Substring-Search`: Enables improved fault-tolerant search for substrings in (N)VARCHAR columns.  
`excessTokenWeight`: Defines the impact of superfluous tokens on the `SCORE()` when using text search.

## Related Information

[SAP HANA Developer Guide](#)

## 9.5.12 Text Analysis (New and Changed)

### New or Improved Language Coverage

This version introduces new and improved language coverage for the following text analysis options:

- `EXTRACTION_CORE`
  - New: Dutch, Portuguese
  - Improved: English, French, German, Italian, Korean, Russian, Spanish
- `EXTRACTION_CORE_VOICEOFCUSTOMER`
  - New: Simplified Chinese
  - Improved: French, German, Spanish

The voice of the customer content for Simplified Chinese includes the following major fact types:

- Sentiments: Expression of a customer's feelings about something.

- Problems: A statement about something that impedes a customer's work.
- Requests: Expression of a customer's need for an enhancement/change.
- Profanity: Defines a set of pejorative vocabulary.
- Emoticons: Expression of someone's feelings about the whole sentence or situation.

The voice of the customer content for French, German, Spanish includes additional major fact types and additional social slang coverage.

- Profanity: Defines a set of pejorative vocabulary.
  - Ambiguous: Words and phrases that are pejorative only in certain contexts.
  - Unambiguous: Words and phrases that are always pejorative.
- Emoticons: Expression of someone's feelings about the whole sentence or situation.
- Additional social slang coverage.

## New or Improved Text Analysis Features

- New Language Identification  
Determines the natural language of given content.
  - Automatic selection of language-specific system dictionaries and rules
  - Support for 31 languages
  - High precision, including on short texts
  - Minimum required length of input text is 30 characters, with a maximum of 300 characters (both configurable).
  - Confidence threshold is configurable. Default value: 50%
  - If reliable language detection cannot be performed, the first language in the list of the LANGUAGE\_DETECTION parameter will be used as the default language.
- Greater Fact Extraction Throughput  
Extreme scalability of fact extraction throughput:
  - Removal of multi-thread ceiling for CGUL rule. Applies specifically to the EXTRACTION\_CORE\_VOICEOFCUSTOMER configuration option
  - 98.5% CPU parallelization
- New TA\_OFFSET Column ID  
Get the coordinates of the extracted entity or facts relative to the document.
  - Additional column store to the \$TA\_<index\_name> table
  - Render highlighting back to the source
  - Calculate proximity between entities or facts
- Improved handling of entity extraction found in the e-mail formats EML and MSG:
  - Automatic recognition of e-mail formats
  - Higher quality text output
  - Message formatting and encoded binary attachments are ignored
- The \$TA\_<index\_name> table that stores the extracted entities and linguistic markup results can now be partitioned. You can do this if the \$TA table becomes too large. Partitioning supports you by improving manageability and performance. For example, you can use the following command to partition the \$TA table using the hash partition strategy: **ALTER TABLE "\$TA\_<index\_name>" PARTITION BY HASH (<PRIMARY\_KEY\_ATTR\_1>, ... , <PRIMARY\_KEY\_ATTR\_N>) PARTITIONS <N>**

## 9.5.13 SAP HANA Info Access for Search UIs (New and Changed)

As of SAP HANA SPS 06, SAP HANA info access is enhanced by the following capabilities:

- Enhanced security with the new end user role `sap.bc.ina.service.v2.userRole::INA_USER`.

### Caution

This new role grants access to the info access HTTP service. Without this role, a request from the user will result in an HTTP status 403 error (not authorized).

- New SAP HANA simple info access (SINA) API. This is a client-side or front-end JavaScript API for developing browser-based search UIs.  
This API provides a simplified set of features from the SAP HANA info access HTTP service, such as freestyle-searching in an attribute view, receiving results for lists and simple charts, and filtering.
- Changed lifecycle management process for implementing and updating the client-side info access components (UI toolkit and SINA).  
The client-side components are no longer shipped with the SAP HANA database. They are now packaged together in a separate delivery unit that is part of the SAP HANA platform stack.

## Related Information

[SAP HANA Developer Guide](#)

## 9.5.14 SAP HANA SQL (New and Changed)

As of SAP HANA SPS 06, the SAP HANA database provides the following new and changed SQL features.

## New SQL Statements

### Access Control

- ALTER CREDENTIAL  
Modifies an existing component-specific or application-specific credential.
- CREATE CREDENTIAL  
Creates a component-specific or application-specific credential.
- CREATE REMOTE SOURCE  
Defines an external data source connected to SAP HANA database.
- DROP CREDENTIAL  
Removes an existing component-specific or application-specific credential.

- DROP REMOTE SOURCE  
Removes an existing external data source.

#### Data Definition

- COMMENT ON  
Add comments to tables, views or their columns.
- CREATE STATISTICS  
Creates data statistics objects that approximate the specified data sources.
- DROP STATISTICS  
Drops data statistics objects.
- REFRESH STATISTICS  
Rebuilds data statistics objects.

#### System Management

- ALTER SYSTEM LOAD PERFTRACE  
Converts .tpt files into tables.

## New SQL Functions

- TO\_FIXEDCHAR  
Returns the first n characters of a string.
- NANO100\_BETWEEN  
Computes the number of 100 nano seconds between date arguments.
- LANGUAGE  
Returns the language of the corresponding table column.
- MIMETYPE  
Returns the MIME type of the corresponding table columns.
- SCORE  
Obtains the relevance of the results for search queries using the CONTAINS predicate.
- RAND  
Returns a pseudo-random value.
- Window Functions  
CUME\_DIST, FIRST\_VALUE, LAST\_VALUE, NTH\_VALUE, NTILE, PERCENT\_RANK added.

## Other Updates

#### Access Control

- ALTER SAML PROVIDER  
ENABLE|DISABLE USER CREATION options added.
- ALTER USER  
X509 support  
VALID <validity\_specification>  
<set\_user\_parameters> and <clear\_user\_parameter\_option>

- CREATE ROLE  
SAP\_INTERNAL\_HANA\_SUPPORT role added
- CREATE SAML PROVIDER  
ENABLE|DISABLE USER CREATION options added.
- CREATE USER  
x509 support added  
VALID <validity\_specification>  
<set\_user\_parameters>
- GRANT  
<system\_privilege> new options BACKUP OPERATOR, CREATE REMOTE SOURCE, CREATE SCENARIO, CREATE VIRTUAL TABLE, CREDENTIAL ADMIN added.  
<source\_privilege> parameters added that can be used to restrict the access and modifications of a remote source entry.
- REVOKE  
ON REMOTE SOURCE - option added that revokes privileges for remote sources.

## Data Definition

- ALTER SEQUENCE  
<sequence\_parameter> CACHE added: The cache size with which a range of sequence numbers will be cached in a SAP HANA host.  
<sequence\_parameter> NO CACHE added: Prevents SAP HANA hosts from using a sequence number cache.
- ALTER TABLE  
MEMORY THRESHOLD <memory\_threshold\_value> - Memory threshold value for LOB types added.  
PRIMARY KEY <unique\_inverted\_type\_index> Added. Allows hash encoding of a composite key in a condensed manner. This allows for faster equality queries over the composite keys, as well as reduced memory requirements for storage of the composite key.  
<column\_store\_mode> added. Specifies which column to use for destination column table.  
<schema\_flexibility\_option> added - Enables or disables schema flexibility for the specified table.  
<load\_unit> - Specifies the unit of data loading for a table.  
<table\_conversion\_clause> - Specifies which column to use for destination column table.
- CREATE AUDIT POLICY  
Audit policy groupings changed.  
New audit policies added: ACTIVATE REPOSITORY CONTENT, EXPORT REPOSITORY CONTENT, IMPORT REPOSITORY CONTENT, DISCONNECT SESSION, CANCEL SESSION, BACKUP CATALOG DELETE
- CREATE FULLTEXT INDEX  
<fulltext\_parameter> MIME TYPE option added, which sets default mime type used for preprocessing.
- CREATE SEQUENCE  
<sequence\_parameter> CACHE and NO CACHE added. These allow/disallow SAP HANA hosts to cache sequence numbers.
- CREATE TABLE  
MEMORY THRESHOLD <memory\_threshold\_value> - Memory threshold value for LOB types added.  
PRIMARY KEY <unique\_inverted\_type\_index> Added. Allows hash encoding of a composite key in a condensed manner, and allows for faster equality queries over the composite keys, as well as reduced memory requirements for storage of the composite key.  
<like\_without\_option> WITHOUT GLOBAL TEMPORARY and WITHOUT LOCAL TEMPORARY options added  
<column\_definition> load unit added.  
<load\_unit> - Specifies the unit of data loading for a table.

---

CREATE VIRTUAL TABLE added. Provides a way to access an existing table/view on a remote source from an SAP HANA instance.

- CREATE TRIGGER  
<transition> transition table option added. This represent records as table variable being changed by the trigger triggering DML.

#### Data Import / Export

- EXPORT  
STRIP - option added. Specifies that attributes that can be reconstructed at import time should not be stored in the export file.
- IMPORT  
AT LOCATION - option added. Using this parameter it is possible to specify the index server where tables are created and imported.
- IMPORT FROM  
AT LOCATION - option added. Using this parameter it is possible to specify the index server where tables are created and imported.

#### Procedural Statements

- CREATE FUNCTION  
ARRAY datatype added.
- CREATE PROCEDURE  
ARRAY datatype added.

#### System Management

- ALTER SYSTEM START PERFTRACE  
APPLICATION parameter added - Restricts perftrace collection to the application name.

#### Changed SQL Functions

- ROUND  
<rounding\_mode> - parameter added. Allows selection of how rounding should be carried out.

## 9.5.15 SAP HANA System Views (New and Changed)

As of SAP HANA SPS 06, the SAP HANA database provides the following new and changed System Views:

- AFL\_AREAS
- AFL\_FUNCTIONS
- AFL\_FUNCTION\_PROPERTIES
- AFL\_PACKAGES
- CREDENTIALS
- DATA\_STATISTICS
- EFFECTIVE\_ROLES
- GEOCODE\_INDEXES
- M\_DEBUG\_CONNECTIONS
- M\_DEBUG\_SESSIONS
- M\_FUZZY\_SEARCH\_INDEXES



- M\_PERSISTENCE\_ENCRYPTION\_KEYS
- M\_PERSISTENCE\_ENCRYPTION\_STATUS
- M\_PLUGIN\_MANIFESTS
- M\_REMOTE\_CONNECTIONS
- M\_REMOTE\_STATEMENTS
- M\_RS\_MEMORY
- M\_SEQUENCES
- M\_SERVICE\_NETWORK\_IO\_RESET
- M\_TEMPORARY\_OBJECT\_DEPENDENCIES
- M\_TRACE\_CONFIGURATION
- M\_TRACE\_CONFIGURATION\_RESET
- M\_VOLUME\_IO\_DETAILED\_STATISTICS
- M\_VOLUME\_IO\_DETAILED\_STATISTICS\_RESET
- M\_VOLUME\_IO\_RETRY\_STATISTICS
- M\_VOLUME\_IO\_RETRY\_STATISTICS\_RESET
- M\_VOLUME\_IO\_TOTAL\_STATISTICS
- M\_VOLUME\_IO\_TOTAL\_STATISTICS\_RESET
- REMOTE\_SOURCES
- SEARCH\_RULE\_SETS
- SEARCH\_RULE\_SET\_CONDITIONS
- SESSION\_COOKIES
- VIRTUAL\_COLUMNS
- VIRTUAL\_TABLES
- X509\_USER\_MAPPINGS

New Tables (Statistics Server):

- GLOBAL\_DEC\_EXTRACTOR\_STATUS
- GLOBAL\_DISKS
- GLOBAL\_ROWSTORE\_TABLES\_SIZE
- GLOBAL\_TABLE\_PERSISTENCE\_STATISTICS
- HOST\_CONNECTION
- HOST\_CONNECTION\_STATISTICS
- HOST\_CS\_UNLOADS
- HOST\_LONG\_IDLE\_CURSOR
- HOST\_LONG\_SERIALIZABLE\_TRANSACTION
- HOST\_SAVEPOINTS
- HOST\_SERVICE\_COMPONENT\_MEMORY
- HOST\_SQL\_PLAN\_CACHE
- HOST\_UNCOMMITTED\_WRITE\_TRANSACTION
- HOST\_VOLUME\_IO\_DETAILED\_STATISTICS
- HOST\_VOLUME\_IO\_RETRY\_STATISTICS
- HOST\_VOLUME\_IO\_TOTAL\_STATISTICS

New Statistics Server Views:

- STATISTICS\_CURRENT\_ALERTS
- STATISTICS\_LAST\_CHECKS

#### Deprecated System Views

- M\_VOLUME\_IO\_PERFORMANCE\_STATISTICS
- M\_VOLUME\_IO\_PERFORMANCE\_STATISTICS\_RESET
- M\_VOLUME\_IO\_STATISTICS
- M\_VOLUME\_IO\_STATISTICS\_RESET

#### Deprecated tables (Statistics Server):

- HOST\_SAVEPOINT\_STATISTICS
- INDEX\_SERVER\_HEAP\_MEMORY\_STATISTICS

#### Documentation Changes:

The unit column appears only in tables that have at least one field with a unit value.

## Related Information

[SAP HANA Database – System Views Reference](#)

## 9.5.16 SAP HANA Predictive Analysis Library (Changed)

As of SAP HANA SPS06, the SAP HANA Predictive Analysis Library provides the following new algorithms:

- DBSCAN (Density-Based Spatial Clustering of Applications with Noise)  
A popular cluster analysis algorithm. It does not require the input of a pre-determined number of clusters, as is the case of K-Means, and is very flexible in that it can find arbitrarily shaped clusters.
- Link Prediction  
An algorithm mainly used in social network analysis. It supports four methods in this release: Common Neighbors, Jaccard's Coefficient, Adamic/Ada, and Katz.
- Naive Bayes  
A simple classification algorithm based on Bayes theorem. It estimates the class-conditional probability by assuming that the attributes are conditionally independent of one another. Despite its simplicity, Naive Bayes works well in areas like document classification and spam filtering, and it only requires a small amount of training data to estimate the parameters necessary for classification.

---

# 10 SAP HANA Appliance Software SPS 05, Features Included in Revision 47

## 10.1 Installation and Update

### 10.1.1 SAP HANA Platform Edition

The Diagnostics Agent 7.3 was added to the SAP HANA Platform Edition.

## 10.2 Security

### 10.2.1 SAP HANA Security Features (New)

As of SAP HANA SPS 05, Revision 47, the following new security features are available:

#### Authorization

Two new standard roles have been defined in the SAP HANA user management system for SAP HANA UI Integration Services:

- **SITE\_DESIGNER**  
For designers of application sites
- **SITE\_USER**  
For end users of application sites

---

## Related Information

[SAP HANA Security Guide](#)

## 10.3 Development

### 10.3.1 SAP HANA Modeler (New)

As of SAP HANA SPS 05, Revision 47, the SAP HANA Modeler provides the following new feature:

#### Import Role Base Authorizations

You can now choose to import the analysis authorizations associated with the BW roles for the InfoProviders. In this case, all the analysis authorizations assigned to the selected roles are merged as one or more analytic privileges.

### 10.3.2 Local Table Types in SQLScript Editor (New)

As of SAP HANA SPS 05, Revision 47, you can use table types to define parameters for a procedure that represent tabular results in the SAP HANA SQLScript editor. The parameters have a type and are either based on a global table (with a reference to a catalog table) or a local table type.

## Related Information

[SAP HANA Developer Guide](#)

### 10.3.3 SAP HANA UI Integration Services (New)

SAP HANA UI Integration Services is a set of Eclipse-based and browser-based tools, as well as client-side APIs, which enable you to integrate standalone SAP HANA Extended Application Services (XS) client applications into web user interfaces to support end-to-end business scenarios.

---

## Related Information

[SAP HANA Developer Guide](#)

---

# 11 SAP HANA Appliance Software SPS 05, Features Included in Revision 45

## 11.1 Installation and Update

### 11.1.1 Documentation Changes

Several changes have been made to the installation and update documentation set that is provided with the SAP HANA appliance software SPS 05:

- SAP HANA Master Guide (changed)
  - The topic "Software Components" was changed. The SAP HANA appliance software enterprise extended edition was removed. The SAP HANA appliance software platform edition and the SAP HANA appliance software enterprise edition were changed.
  - The topic "Hardware and Software Requirements" was changed. New requirements were added.
  - The topic "Log-Based Replication" was removed from the section "SAP HANA Replication Technologies".
  - The topic "Extractor-Based Data Acquisition" was added to the section "SAP HANA Replication Technologies".
- SAP HANA Installation Guide with Unified Installer (changed)
  - The guide was restructured.
  - The section "Preparation" was updated.
  - The section "Running the Installer" was updated.
  - The topic "Performing a Distributed System Installation (Optional)" was enhanced.
- SAP HANA Database - Server Installation Guide (removed)

As of SAP HANA SPS 05 the SAP HANA Database - Server Installation Guide is no longer publicly available. Relevant information was moved to other documents.
- SAP HANA Automated Update Guide (changed)
  - The guide was restructured.
  - The topic "Setting Up the SAP HANA Studio" was updated. The description of the SAP HANA studio security configuration was transferred to a new topic "Configuring HTTPS for SAP HANA Studio".
  - The updated topic "Performing an Automated Update" now describes all update scenarios (from SMP, with downloaded content – for both Single SP and SPS (Stack)).
  - The new topic "Starting Modes for Software Update Manager for SAP HANA" now contains information about the `catalina.properties` file.

- SAP HANA Installation and Configuration Guide - Log-Based Replication (SYBASE)  
As of SAP HANA SPS 05 the SAP HANA Installation and Configuration Guide - Log-Based Replication (SYBASE) is no longer publicly available. The Log-Based Replication (SYBASE) is part of the SAP HANA appliance software enterprise extended edition that runs out of maintenance on December 31, 2012.
- SAP HANA Master Update Guide (changed)  
The SAP HANA Master Update Guide describes the necessary steps to perform an update from SAP HANA SPS 04 to SAP HANA SPS 05.
- SAP HANA Database - Studio Installation and Update Guide (changed)
  - The *System Requirements* section was updated to reflect new information regarding the 32bit repository client.
  - The *Starting the SAP HANA Studio* sections for both Windows and Linux were updated to include information regarding how to set the path to the repository client in the SAP HANA studio.

## Related Information

[SAP HANA Master Guide](#) 

[SAP HANA Installation Guide with Unified Installer](#) 

[SAP HANA Master Update Guide](#) 

[SAP HANA Automated Update Guide](#) 

### 11.1.2 SAP HANA Studio Installation (Changed)

The new installation option `--vm` allows you to specify the path of the Java runtime file.

## Related Information

[SAP HANA Database - Studio Installation Guide](#) 

### 11.1.3 SAP HANA Appliance Software Enterprise Extended Edition (Deprecated)

The SAP HANA appliance software enterprise extended edition will run out of maintenance on December 31, 2012.

---

## 11.1.4 SAP HANA Installation with SAP HANA Unified Installer (New & Changed)

The SAP HANA unified installer and the SAP HANA on-site configuration tool have the following new and changed features:

- Installing Application Function Libraries (AFLs) on a SAP HANA system
- Changing the SAP HANA system edition
- Setting up a distributed SAP HANA system
- Installing and uninstalling a SAP HANA system with multiple system IDs (SIDs) on a single SAP HANA appliance (for example, to use one system for test and development, but not for production use)

### Related Information

[SAP HANA Installation Guide with Unified Installer](#) 

## 11.1.5 SAP HANA Automated Update with Software Update Manager (New & Changed)

The SAP HANA automated update with the software update manager has the following new and changed features:

- Deploying SAP HANA content
- Performing automated updates for Application Function Libraries (AFLs)
- Performing automated updates of a distributed SAP HANA system
- Updating a SAP HANA system with multiple system IDs (SIDs) on a single SAP HANA appliance
- Automated starting/stopping of the SAP HANA software update manager using the SAP HANA studio
- Updating SAP HANA using stack information from SAP Solution Manager
- Updating SAP HANA at the component level using an automatic connection to SAP Service Marketplace (SMP)

### Related Information

[SAP HANA Automated Update Guide](#) 



---

## 11.2 Security

### 11.2.1 SAP HANA Security Features (New & Changed)

As of SAP HANA SPS 05, the following new and enhanced security features are available:

#### Authentication

- Password blacklist  
Support for a password blacklist has been implemented in SAP HANA with a table for preventing certain words and parts of words from being used in passwords. In addition, administrators can indicate whether passwords will be case sensitive.
- SAP HANA studio enhancements for user authentication
  - You can now create and configure SAML identity providers for a database system directly in the system's security properties in the SAP HANA studio.
  - The user editor in the SAP HANA studio now contains configuration options for all authentication mechanisms (internal, Kerberos, and SAML).

#### Authorization

- Roles as design-time objects  
In addition to being able to create roles as runtime objects on the basis of SQL statements, it is now possible to create roles as design-time objects in the repository of the SAP HANA database. Roles created in the repository offer more flexibility and are therefore recommended. For example, roles created in the repository can be transported between systems, and application developers can model roles that ship with their application.
- Analytic privileges
  - IS\_NULL and NOT\_NULL can now be used as operators to define value filters in restrictions.
  - All filter operators (except IS\_NULL and NOT\_NULL) accept empty strings (" ") as filter operands.
  - The attribute restriction now supports dynamic value filters. A dynamic value filter consists of an operator and a stored procedure call that determines the operand value at runtime.  
Dynamic filters make it possible to reuse the same analytic privilege for several users and to change the filter condition in the underlying tables and views without having to change the analytic privilege itself.  
For example, an analytic privilege contains a stored procedure that queries the user's department from an organization table and checks in another table whether the user has manager status and is therefore authorized to access the queried data.

### **i** Note

Currently, dynamic value filters in the attribute restriction of analytic privileges can only be created manually using SQL and not in the modeler of the SAP HANA studio.

- **SUPPORT role**  
A new standard role, `SUPPORT`, is being provided with the SAP HANA database. The `SUPPORT` role is meant to be used for support cases.

## **Data Volume Encryption**

- You can configure the SAP HANA database to encrypt data at rest (data volumes).
- Encryption works at page level and uses AES256 as the encryption algorithm.

## **Auditing Database Activity**

The auditing feature of the SAP HANA database allows you to monitor and record selected actions performed in your database system. In other words, it provides you with visibility on who did what (or tried to do what) and when.

Auditing in the SAP HANA database has been enhanced in the following ways:

- Changes to users can now be logged (`ALTER USER` statement)
- Read and write access to sensitive data in tables, views, and procedures can now be logged (`SELECT`, `INSERT`, `UPDATE`, `DELETE`, and `EXECUTE` statements)
- The SAP HANA studio has a new Security editor in which you can perform the following auditing related tasks:
  - Activate and configure auditing for a database system
  - Create, enable, disable, and delete audit policies

## **SAP HANA Extended Application Services (SAP HANA XS)**

- SAP HANA Extended Application Services (SAP HANA XS) enables you to define access to each individual application package that you want to develop and deploy. The application-access file enables you to specify who or what is authorized to access the content exposed by the application package and what content they are allowed to see.
- For example, you use the application-access file to specify if authentication is to be used to check access to package content, and whether rewrite rules are in place for the exposure of target and source URLs.

---

## Network Configuration

- In previous releases, the separation between internal and external communication could only be achieved using configurations on the operating system level by using host files and IP table configurations.
- Now administrators can separate internal and external networks. SAP HANA provides additional configuration capabilities to enable the enforcement and the isolation of the internal communication in such a way that the internal ports and communication is only possible between the hosts of a scale-out HANA instance or locally in a single-host scenario.

## 11.3 System Administration

### 11.3.1 Documentation Changes

Several changes have been made to the system administration documentation set that is provided with SAP HANA Appliance Software SPS 05:

- The following guides have been integrated into the SAP HANA Administration Guide:
  - SAP HANA Database – Administration Guide
  - SAP HANA Database – Backup and Recovery Guide
  - SAP HANA Database – Scale Out Guide
  - SAP HANA Database – Partitioning and Distribution of Large Tables
- The following guides have been moved to the SAP HANA Developer Guide:
  - SAP HANA Modeling Guide
  - SAP HANA Content Lifecycle Management Guide
- The PDF versions of the SQL Reference Guide and System Tables and Monitoring Views documentation have been removed from the System Administration section on the SAP Help Portal. The HTML version of these two guides is still available in the Development Information section of the SAP Help Portal.
- SAP HANA Technical Operation Manual (Changed)
  - Included new section on Change Management
  - Included new section on integrating SAP HANA into a Central Operations Concept
  - Included new topics on monitoring, administration and recovery of SAP HANA Direct Extractor Connection (DXC)
  - Updated topic on High Availability

## 11.3.2 SAP HANA Database Backup and Recovery (New and Changed)

New features and changes with SPS 05.

With SPS 05, the following changes were made to the backup and recovery functionality of SAP HANA.

### Support for Third-party Backup Tools

- SAP HANA now provides an API (Backint for SAP HANA) that can be implemented by a third-party backup agent.  
The third-party backup agent runs on the SAP HANA server and communicates with the third-party backup server.
- Full integration with SAP HANA studio allows configuration and execution of backups using Backint for SAP HANA.

#### Note

SAP certification is required for “Backint for SAP HANA” implementations by third-party vendors.

### Database Copy from Multiple-Node to Single-Node System

It is now possible to copy a scale-out SAP HANA database with multiple nodes to a single-node SAP HANA database.

### UI Enhancements in SAP HANA Studio

The new [Backup](#) section in SAP HANA studio offers an overview of currently running backups and includes the option to cancel running data backups. Also, there is now a configuration page for data backup, log backup, and backups performed by third-party backup tools.

To open the [Backup](#) section, double-click [Backup](#) in the [Navigator](#) view in SAP HANA Studio.

## 11.3.3 SAP HANA Administration (New & Changed)

As of SAP HANA SPS 05, the SAP HANA studio provides the following new and changed administration and monitoring features.

## Monitoring (New and Changed)

- **Monitoring for high availability and disaster recovery scenarios**  
If you are operating a secondary instance of your database, for example in a high availability scenario, then information from the new monitoring view M\_SERVICE\_REPLICATION is available in the SAP HANA studio. The status of replication from your productive database system to a secondary system is displayed on the [Overview](#) tab of the Administration editor, and the [Landscape](#) tab has the additional sub-tab [Secondary Landscape Replication](#).
- **Load monitor**  
The load monitor available on the [Performance](#) tab of the Administration editor now allows for more fine-grained monitoring of load history. An interval of 10 seconds is supported.
- **Job progress monitor**  
The progress of the following operations related to SAP HANA optimized data store objects (DSO) can now be monitored on the ► [Performance](#) ► [Job Progress](#) ► tab:
  - DSO activation
  - DSO rollback and migration standard DSO
  - SAP HANA-optimized DSO
- **Session monitor**  
A new [Sessions](#) sub-tab is available on the [Performance](#) tab of the Administration editor. Here you can monitor all the sessions in the system, for example, you can identify inactive sessions, investigate blocking situations, view memory consumption by session, and cancel a session.
- **Server query execution time**  
In the SQL editor, the server query execution time ([server processing time](#)) is now displayed in the status area at the bottom of the screen.
- **Memory usage statistics**  
The display of memory usage values has been improved. The [Overview](#) tab of the Administration editor now provides the value for peak used memory. On the ► [Landscape](#) ► [Services](#) ► tab, you can read the peak used memory for each database service. You can also reset memory statistics here. This can be useful if you want to establish the impact of a certain workload on memory usage. So for example, you can reset the memory statistics, run the workload, and then examine the new peak used memory value.
- **Volume statistics**  
The following additional information is now available on the [Volumes](#) tab of the Administration editor:
  - Log segment status for log segment files
  - Total read time and the total write time of data and log files
- **Statistics server checks**  
The statistics server now performs several additional checks and alerts of critical situations. For example, checks now exist for the following:
  - Blocking situations that exceed the threshold values
  - Trace files that exceed the threshold size

## Support for Distributed Systems (New)

- **SAP HANA studio connectivity for multi-host systems**  
For a distributed system, the master host is entered in the system's properties and is used to establish the connection to the database. If this master host is unavailable, the connection is established automatically through one of the other hosts in the system.

- User interface for table redistribution (new)

In a distributed SAP HANA system, tables and table partitions are assigned to an index server on a particular host at their time of creation, but this assignment can be changed. In certain situations, it is even necessary. For example, if you plan to remove a host from your system, then you first need to move all the data on that host first to the other hosts in the system. Redistributing tables may also be useful if you suspect that the current distribution is no longer optimal. Although it is possible to move tables and table partitions manually from one host to another, this is neither practical nor feasible for a large-scale redistribution of data. The SAP HANA database supports several *redistribution operations* that use complex algorithms to evaluate the current distribution and determine a better distribution depending on the situation.

The new [Redistribution](#) sub-tab of the [Services](#) tab in the Administration editor supports the following situations:

- You have added a new host to your system and want to redistribute your data accordingly
- You want to optimize current table distribution
- You want to optimize table partitioning

If you are planning to remove a host from your system, you can perform the required table redistribution directly on the [Landscape](#) [Configuration](#) tab.

## Tracing (New and Changed)

- It is now simpler to collect information from your system to help SAP Support analyze and diagnose problems.

You can now collect diagnosis information into a zip file, which you can download and attach to a support message. This feature is available on the [Diagnosis Files](#) tab of the Administration editor. The underlying Python script `fullSystemInfoDump.py` has been extended to collect further relevant information from trace files and system tables.

- The configuration options for SQL trace have been extended.

You can now specify a user-specific name for the trace file.

- The kernel profiler is now available as an additional trace on the [Trace Configuration](#) tab of the Administration editor.

The kernel profiler is a sampling profiler that collects information about frequent and/or expensive execution paths during query processing. It can be used to analyze performance issues with systems on which third-party software cannot be installed, or parts of the database that are not accessible by the performance trace.

- The configuration options for the performance trace have been extended.

If you are activating the performance trace as part of an end-to-end trace scenario, you can specify the passport trace level as an additional filter. This means that only requests that are marked with a passport of the specified level are traced.

## Plan Visualizer (Changed)

The plan visualizer is a powerful tool for studying the performance of queries in SAP HANA. It generates a graphical view of a statement's execution plan before and after execution.

---

You can now also visualize the execution plan of a statement from both the [SQL Plan Cache](#) and [Expensive Statements](#) sub-tabs of the [Performance](#) tab.

In addition, the visualization of the executed plan has been enhanced as follows:

- Details about physical table access and parallelization of CPU resources are now available.
- A [Timeline](#) view is now available.  
This view shows various execution details of the plan operations processing one SQL statement in time. Both the runtime of the whole processed query and the runtime of the individual plan operations contributing to the result of a given query are displayed.
- Readability and usability have been improved through the introduction of SQL-level abstractions. POPs are summarized into meaningful statements for SQL experts in the [Timeline](#) view, for example, [grouping](#) and [JEAggregate](#).

## Import/Export Wizard (Changed)

All catalog objects can now be exported to a file system (with and without dependencies) and then imported back into another database, for example, to move data from a test to a productive system.

## Support for Full-Text Index (New)

It is now possible to create full-text indexes for tables. The table editor of the SAP HANA studio has been enhanced to support the new index type.

## System Landscape Directory (SLD) Data Supplier (Changed)

The following additional data is collected and sent to SLD:

- Content of the SAP HANA repository
- Application Function Library (AFL) data
- Internal port and SQL port

## 11.4 Data Provisioning and Data Modeling

Here you find information about new and changed features in the data provisioning and data modeling area.

### 11.4.1 Documentation Changes

Several changes have been made to the installation and update documentation set that is provided with SAP HANA Appliance Software SPS 05:

- SAP HANA Installation and Configuration Guide - Log-Based Replication (SYBASE)  
As of SAP HANA SPS 05 the SAP HANA Installation and Configuration Guide - Log-Based Replication (SYBASE) is no longer publicly available. The Log-Based Replication (SYBASE) is part of the SAP HANA appliance software enterprise extended edition that runs out of maintenance on December 31, 2012.

### 11.4.2 Trigger-Based Replication (SAP Landscape Transformation (LT) Replication Server)

As of SAP HANA SPS 05, the following new and enhanced features are available:

- Technical readiness for integrated use of SLT with SAP ERP Accelerators and other SAP HANA Application Accelerators
- Improved usability
  - Context-related documentation is available for the key user interfaces of the SAP LT Replication Server accessible from a dedicated Help Center
  - Advanced status tracking (when using access plan / range calculation)
- Improved stability
  - Manual steps on SLT system after implementing a note or support package eliminated
  - Support-related expert functions streamlined
- New and improved performance options (for initial load and replication)
  - New option for load procedure using reading type 4 with ROW IDs
  - Optimized job management: free-up background jobs and resources for tables in replication with low change rates


## 11.5 Development

### Note

Application development with SAP HANA Extended Application Services (SAP HANA XS) is currently only available as an SAP-led project solution, for pre-approved customers and partners. This applies to server-



---

side JavaScript programming, support for ODATA and XMLA, Web server features and the Web application development environment. For more information, see [SAP Note 1779803](#) .

## 11.5.1 UI Development Toolkit for HTML5 (new)

The UI development toolkit for HTML5 (SAPUI5) is a user-interface technology that is used to build and adapt client applications. You can use SAPUI5 to extend your existing SAP HANA applications and to build your own SAPUI5 application projects.

SAPUI5 runtime is a client-side HTML5 rendering library with a rich set of UI controls for building desktop and mobile applications. SAPUI5 runtime is delivered as part of the SAP HANA studio.

To support you in developing applications, SAPUI5 tools comes with a set of Eclipse-based wizards that enable you to create application projects and views according to the model-view-controller concept and other features such as an editor with JavaScript code completion, templates and snippets, and application previews.

### Related Information

[SAP HANA Developer Guide](#)

## 11.5.2 Building Search Apps Using the UI Toolkit for Info Access (Changed)

To build modern, highly interactive search apps for Web browsers, you can use the HTML5 UI toolkit for Info Access. In SPS05 the toolkit has a new layout concept with a facet repository and free dragging and dropping of facets. It also offers additional chart types, the line chart and the grouped bar chart, and the selection of multiple filters.

### Related Information

[SAP HANA Developer Guide](#)

## 11.5.3 Documentation Changes

Several changes have been made to the developer documentation set that is provided with SAP HANA Appliance Software SPS 05:

- There is a new SAP HANA Developer's Guide, which integrates the following guides:
  - SAP HANA Development Guide – How to Use SQL and SQLScript for Data Modeling
  - SAP HANA Modeling Guide
  - SAP HANA UI Toolkit for Information Access
  - SAP HANA Database Developer Guide for the SQL Function Fuzzy Search
  - SAP HANA Content Lifecycle Management Guide
- The PDF versions of the SQL Reference Guide and System Tables and Monitoring Views documentation have been removed. The HTML version of these two guides is still available.
- The SAP HANA Database - SQL Script Guide has been redesigned as a reference guide and renamed to SAP HANA SQLScript reference.
- The following developer references have been added:
  - SAP HANA XS JavaScript API Reference
  - SAP HANA Business Function Library (BFL) Reference
  - SAP HANA Predictive Analysis Library (PAL) Reference

## 11.5.4 SAP HANA SQL (Changed)

As of SAP HANA SPS 05, the SAP HANA database provides the following new and changed SQL features.

### New SQL Statements and Functions

- ALTER SYSTEM PERSISTENCE ENCRYPTION (New)  
Defines if persistent data should be stored on disk in encrypted or non-encrypted mode.
- IMPORT SCAN (New)  
Fills a table with an overview of import data in a directory.
- Windows Functions (new)  
RANK, DENSE\_RANK, ROW\_NUMBER, LEAD, LAG: Divide result sets of a query into groups of rows called window partitions.

#### Other updates

- ALTER SAML PROVIDER  
Syntax change from WITH to SET.
- ALTER SYSTEM DISCONNECT SESSION  
Example added for finding long idle sessions.
- ALTER SYSTEM LOGGING  
Example added.
- ALTER SYSTEM SAVE PERFTRACE  
Additional information provided for monitoring and also how to cancel a perftrace job.
- ALTER TABLE  
[ENABLE | DISABLE] SCHEMA FLEXIBILITY option added.  
FUZZY SEARCH INDEX [ON | OFF] option added.  
FUZZY SEARCH MODE [<string\_literal> | NULL] option added.  
REFERENCES Referential update options added.

- CREATE AUDIT POLICY  
Audit action names added: ALTER USER, REPOSITORY\_ACTIVATE, DROP TABLE.  
Target audit actions added: INSERT, UPDATE, DELETE, SELECT, EXECUTE.
- CREATE ROLE  
SUPPORT role added.
- CREATE TABLE  
CS\_GEOMETRY data type added.  
SCHEMA FLEXIBILITY option added.  
FUZZY SEARCH INDEX option added.  
FUZZY SEARCH MODE option added.  
REFERENCES Referential update options added.  
UNLOAD PRIORITY option added.  
LIKE WITHOUT option added.  
AS (<subquery>) [WITH [NO] DATA] option added.
- CREATE TRIGGER  
One trigger per DML operation limit removed.
- DROP ROLE  
SUPPORT role added.
- DROP SEQUENCE  
Default drop behavior redefined.
- DROP SYNONYM  
Default drop behavior redefined.
- DROP TABLE  
Default drop behavior redefined.
- DROP VIEW  
Default drop behavior redefined.
- GRANT  
TRUST ADMIN added, REFERENCES object privilege added.
- IMPORT FROM  
Syntax updates.
- LOAD  
HISTORY parameter added for loading table history.
- LOCATE  
Function return parameter clarified.
- MERGE DELTA  
Privilege information added.
- ROLLBACK  
Example added.
- SELECT ORDER BY  
New ORDER BY parameters NULLS FIRST | NULLS LAST.
- UPDATE  
Target table name now includes alias name, new example added using join to update a table.

## Related Information

[SAP HANA SQL Reference](#)

## 11.5.5 SAP HANA Modeler (New and Changed)

- **Common editor for Attribute View and Analytic View (new)**  
With the SPS05 release there is a new common editor to operate attribute views and analytic views. A single creation wizard is provided for attribute views and analytic views. Also, a separate view-specific section is provided in the wizard according to the selection of view type. The creation wizard and editor for calculation views remains the same.
- **Importing SAP NetWeaver BW Models in the SAP HANA Modeler (new)**  
You use this functionality to import SAP NetWeaver Business Warehouse (SAP NetWeaver BW) models that are SAP HANA-optimized InfoCubes, SAP HANA-optimized DataStore objects and Query Snapshot InfoProviders to the SAP HANA modeling environment. These imported objects are exposed as SAP HANA information models and can be consumed for reporting using client tools, such as SAP BusinessObjects Explorer, SAP BusinessObjects BI 4.0 Suite (Web Intelligence via Universes, Dashboards, Crystal Reports), Microsoft Office and so on. Information model properties are set from the InfoProvider metadata, which will be read using the standard SAP NetWeaver BW RFCs and BAPIs already available. The supported InfoProviders are SAP HANA-optimized InfoCubes, DSOs and Query Snapshot InfoProviders. Also, some of the authorizations associated with the InfoProviders are imported as analytic privileges.
- **Decision Tables (new)**  
You use this feature to create a decision table in order to model related business rules in a tabular format for decision automation.
- **Other features and enhancements:**
  - Refactoring (movement of packages and objects)
  - Package/object filtering in the Navigator view
  - Search for tables, models and column views
  - Copy of single object
  - Activation mode enhancements
  - Intermediate data preview (data preview at node level in calculation view)
  - Input parameter enhancements
  - Variable enhancements
  - Renaming the view fields like columns, calculated columns, and so on using toolbar Rename option
  - Hierarchy changes
  - Keyboard shortcuts for Modeler commands

### Related Information

[SAP HANA Developer Guide](#)

## 11.5.6 Text Analysis (New)

You can now perform text analysis as an in-database process. Text analysis takes unstructured textual data and provides structure by pinpointing and classifying the entities that describe the “who”, “what”, “where”,

---

“when” and “how much”. It allows enterprises to deal with information overload by mining very large bodies of text and making sense of all of the information without having to read every single sentence. Simply put, text analysis automates research analysis from data sources that were previously unprocessable.

There are several options you can choose to extract meaningful information from your texts: linguistic markup (for example tokens, stems, Part-of-Speech tags), entity extraction (for example persons, locations, dates), and "Voice of Customer" fact extraction (for example sentiments, requests, topics). The results of the analysis are stored in a separate table. You can use the content of this table to build search-based or text mining applications.

## Related Information

[SAP HANA Developer Guide](#)

### 11.5.7 SAP HANA SQLScript Editor (New)

In the new SAP HANA SQLScript editor you can create, update and delete stored procedures using file-based architecture and save design-time artifacts in the repository. You can also commit and activate a procedure in the [SAP HANA Development](#) perspective so that it is created as a compiled runtime procedure for the project you are working on.

The SAP HANA SQLScript editor allows you to easily develop your stored procedures. For example, the editor recognizes and highlights SQLScript syntax so you can verify the correctness of your code.

## Related Information

[SAP HANA Developer Guide](#)

### 11.5.8 Fuzzy Search (Changed)

The following changes have been made to the fuzzy search:

- You can use the new FUZZY SEARCH SQL clauses `housetnumber` and `postcode` to enable the fuzzy house number and postcode search on NVARCHAR columns.
- You can use search rule sets to easily change fuzzy search configurations. Previously, the configurations were hardcoded in the SELECT statements. Now, you build the rule sets in a new UI-based search rules editor.
- There is a new search option `similarCalculationMode` with options `compare`, `search`, and `symmetricsearch`.
- Term mappings and stopwords are now language-specific.

- 
- There are also bug fixes and performance optimizations.

## Related Information

[SAP HANA Developer Guide](#)

### 11.5.9 SAP HANA SQLScript Debugger (New)

In the new SAP HANA SQLScript debugger you can easily debug your stored procedure, which allows you to investigate your code in a faster and standardized manner, instead of writing traces. For example, you can set breakpoint markers to indicate where a debugging session should break and you can verify the values of the variables, including input parameters. Accordingly, you can start a break and resume debug session that verifies the correctness of your SQLScript procedure along the execution process.

## Related Information

[SAP HANA Developer Guide](#)

### 11.5.10 SAP HANA System Tables and Monitoring View (Changed)

As of SAP HANA SPS 05, the SAP HANA database provides the following new and changed System Tables and Monitoring Views:

- M\_BACKUP\_CONFIGURATION
- M\_CACHE\_ENTRIES
- M\_CONFIGURATION
- M\_CS\_ALL\_COLUMNS
- M\_CS\_UNLOADS
- M\_LICENSE\_USAGE\_HISTORY
- M\_OBJECT\_LOCKS
- M\_OBJECT\_LOCK\_STATISTICS
- M\_OBJECT\_LOCK\_STATISTICS\_RESET
- M\_REORG\_ALGORITHMS
- M\_REPO\_TRANSPORT\_FILES
- M\_RS\_TABLE\_VERSION\_STATISTICS
- M\_SAVEPOINTS

- M\_SERVICE\_COMPONENT\_MEMORY
- M\_SERVICE\_REPLICATION
- M\_SYSTEM\_INFORMATION\_STATEMENTS
- PRIVILEGES
- REFERENTIAL\_CONSTRAINTS
- REORG\_OVERVIEW
- REORG\_PLAN
- REORG\_PLAN\_INFOS
- REORG\_STEPS
- SAML\_PROVIDERS
- SAML\_USER\_MAPPINGS
- TABLE\_GROUPS

[SAP HANA System Tables and Monitor Views Reference](#)

## 11.5.11 Full Text Search (Changed)

The SAP HANA full text search feature has been enhanced to also cover binary file formats. This allows you to search text in .pdf documents or documents in Microsoft Office file formats, for example. Additional features for displaying the results of SQL search queries are also available.

Detailed documentation of the SAP HANA full text search is delivered as part of the developer guide. This documentation includes information about full text indexes and SQL search queries, as well as a description of the new text analysis feature.

### Related Information

[SAP HANA Developer Guide](#)

## 11.5.12 SAP HANA Extended Application Services (New and Changed)

SAP HANA Extended Application Services (SAP HANA XS) provides applications and application developers with access to the SAP HANA database using a consumption model that is exposed via HTTP.

In addition to providing application-specific consumption models, SAP HANA XS also hosts system services that are part of the SAP HANA database, for example: search services and a built-in Web server that provides access to static content stored in the SAP HANA repository. SAP HANA XS includes the following updates and additions:

- Core Data Services (changed)
- SAP HANA Repository (changed)

- Server-side JavaScript applications (changed)
- OData support (changed)
- Content Lifecycle Management (changed)
- Browser-based Integrated Development Environment (IDE) (changed)
- SAP HANA Development Perspective (changed)
- SAP HANA Change Management (new)

## Core Data Services (Changed)

Core data services (CDS) is a new infrastructure for defining and consuming semantically rich data models in SAP HANA. Using a data definition language (DDL), a query language (QL), and an expression language (EL), CDS is envisioned to encompass write operations, transaction semantics, constraints, and more. The model described in CDS enables you to use the Data Definition Language to define the objects that make up the data-persistence model. You can save the data-persistence object definition as a design-time object that you manage in the SAP HANA repository and activate when necessary.

### Note

Although currently limited in scope, CDS will become the “Data Dictionary” for SAP HANA native development in the future. CDS provided an alternative to the `.hdbtable` syntax for table definition.

The CDS syntax has been expanded to include the following new elements:

- Associations define relationships between CDS entities (tables). Note that associations have not yet been integrated into the catalog/SQL but can be referenced when defining views within the same CDS object.
- The definition of SQL views. Views defined in CDS can utilize the defined associations between entities

A graphical representation of the CDS documents is now available. With the CDS Graphical Editor you can displays a graphical view of CDS entities and their associations. Note that the graphical mode is read-only; you can only make changes to the CDS documents in the source-code editor. It is possible to navigate to the source-code editor directly from the graphical editor.

## SAP HANA Repository (Changed)

The SAP HANA studio provides direct and easy access to the SAP HANA repository, where you can browse the design-time related objects stored in the repository. The repository integration also enables you to use context-sensitive menus in the SAP HANA studio to perform all the most regularly used commands to maintain and manage repository objects, for example: maintain delivery units; create, commit, activate packages and package content; create development workspaces; create, share, and import application projects.

### Note

Dependencies on the command-line tool `regi` and the SAP HANA client have been removed, which simplifies installation and setup. In SAP HANA studio, the [SAP HANA Repository](#) view and browser no longer use the `regi` CLI for operations such as check out, commit, activate, and so on.



---

The following improvements to interaction with the Repository are now visible:

- Improved performance by batching operations;
- Better tolerance for high-latency connections between SAP HANA studio and the SAP HANA server
- Dependencies during activation are considered for operations that involve multiple objects

The following additions and improvements have also been made to the *SAP HANA Repositories* browser in the SAP HANA studio's *SAP HANA Development* perspective:

- Edit the contents of a package directly in the Repository browser
- Remove artifacts from the client: undo a check-out operation without deleting content in the Repository
- Regenerate: force runtime regeneration of artifacts without the need to go through the activation process
- Content deletion: improved handling of content deletion when using the activation option in the Repository browser

## OData Support (Changed)

In SAP HANA XS, the persistence model (for example, tables, views and stored procedures) is mapped to the consumption model that is exposed to clients - the applications you write to extract data from the SAP HANA database. You can map the persistence and consumption models using OData, a resource-based Web protocol for querying and updating data. An OData application running in SAP HANA XS is used to provide the consumption model for client applications exchanging Odata queries with the SAP HANA database

- Support for validation and modification exits using XS JavaScript
- Annotations, for example, sap:label, sap:unit, sap:text, are available for use with texts for analytic views
- Associations between parameterized CalcViews
- Access to translatable parts of arbitrary runtime objects - support for translatable texts

## Application Lifecycle Management (Changed)

SAP HANA XS includes new and extended features that enable you to manage the application lifecycle. The new features include:

- Delivery Unit Dependency Viewer
- Enhanced Create Application Wizard
- Tool support for transport of SAP HANA Changes (Change Management)
- Transport of SAP HANA products (all relevant Delivery Units and product definition)
- Improved system management (without additional logon)
- Object preview during plain file import
- Easier assignment for packages to delivery units
- Application Lifecycle Management screens integration into SAP HANA studio

---

## Browser-Based Integrated Development Environments (Changed)

SAP HANA XS provides a Web-based development tool which you can use for development tasks, for example, creating and editing development objects, without the need for SAP HANA studio. The new Web-based Development Workbench merges the features included in the SAP HANA IDE (Integrated Development Environment) lite and the SAP HANA Web-Based Development Workbench. The new tool provides the following subtools:

- **Editor**  
Includes a browser based IDE for the lightweight creation and editing of development objects and debugging activities
- **Catalog**  
Provides access to the SAP HANA catalog enables you to view tables, views, procedures, functions, etc and their content.
- **Security**  
Provides access to the details of users and user roles. You can also assign roles to users and perform basic user-administration tasks.
- **Trace**  
Provides access to the developer-centric trace files on the SAP HANA server, for example, for the XS Engine and the Index Server.

## SAP HANA Development Perspective (New and Changed)

In the SAP HANA studio, the *SAP HANA Development Perspective* has been improved with the following features:

- **Native SAP HANA repository interface:**
  - Improved performance by batching operations;
  - Better tolerance for high-latency connections between SAP HANA studio and the SAP HANA server
  - Dependencies during activation are considered for operations that involve multiple objects
- **Repository Browser Enhancements:**
  - Edit the contents of a package directly in the Repository browser
  - Remove artifacts from the client: undo a check-out operation without deleting content in the Repository
  - Regenerate: force runtime regeneration of artifacts without the need to go through the activation process
  - Content deletion: improved handling of content deletion when using the activation option in the Repository browser
- **Synchronization View:**
  - Synchronization tools: the SAP HANA Repository synchronization tools have been integrated with the standard Eclipse synchronization tool
  - Pending deletions: you can view any pending deletions on the server even after the content is no longer visible on the client
  - Differences: compare the differences between local client-side content (in the SAP HANA Repository workspace) and remote server-side content (in the SAP HANA Repository)
- **Project Explorer**

The *Project Explorer* view includes the following enhancements:

- Projects now contain both *Catalog* and *Repository Content* nodes
- Options have been added to the context-sensitive *Team* menu, for example: *Remove from Client*, *Activate All...*, *Show in Synchronize View*
- New Artifact Templates  
New wizards enable more streamlined file creation and enforce mandatory file-name conventions. During application development, you can now create SAP HANA XS artifacts such as application descriptors (for example, `.xsapp`, `.xsaccess`, `.xsprivileges`), or SAP HANA XS services such as `.xsodata` and `.xsjs` with the help of a wizard. For database development, you can use similar wizards to create design-time artifacts such as tables, schemas, and sequences (for example, `.hdbtable`, `.hdbsequence`, `.hdbschema`) as well as table-import configurations (`.hdbti`).
- Run Artifacts from the Studio  
Two additional options are now available in the *Run As* context menu of the *Project Explorer* view. You can now run XSJS and OData services directly from the *Project Explorer* and display static HTML pages, too.
- Inactive Testing:  
Developers can now execute the inactive version of of an XSJS or XS OData (`xsodata`) service as well as XSJS libraries (`xsjslib`), or any static Web content. This improves support for multiple developers working on the same content at the same time by enabling them to test their local changes.

#### Note

This feature only works when the SAP HANA server is running in developer mode (using the “developer\_mode” parameter)

and a cookie is set to the name of the Repository workspace you are using.

- SAP HANA Text Editor
  - Generic text editor for all textual based SAP HANA artifacts without their own specific editor
  - Default mapping in SAP HANA studio now uses this editor
  - Always displays the following information in the editor title bar: SAP HANA system ID, the editing user, the host name of the SAP HANA server, and SAP HANA instance number
- Mass Activation  
A new activation dialog displays all inactive objects across all projects for the same Repository workspace. The activation option is available in the context-sensitive menu **Team > Activate All**.
- CDS Graphical Editor  
A graphical representation of the CDS documents is now available, which displays a graphical view of CDS entities and their associations. Graphical mode is read-only; you can only make changes to the CDS documents in the source-code editor. It is possible to navigate to the source-code editor directly from the graphical editor.
- JS Lint Setting  
Access to the JS Lint setting has been moved to: **Window > Preferences > SAP HANA > Application Development > JS Lint**

## SAP HANA Change Management (New)

SAP HANA SPS 07 includes a new change management feature that enables developers to track changes to repository objects. Change Management provides the infrastructure for tracked development. When a system

---

is configured to work with Change Management, the activation of a repository object prompts the developer to assign it to a container or *Change*. This allows a developer or a development team to work on a development object or artifact and release the change only when the object is ready to be transported to the test system. This provides more precise control over which objects are transported from the development system. An object's change must be released in order to be included in the export in which the delivery unit containing the object is transported. This enables the creation of a delivery unit (DU) that is composed of only released objects.

## Related Information

[SAP HANA Developer Guide](#)

### 11.5.13 SAP HANA SQLScript (Changed)

As of SAP HANA SPS 05, the SAP HANA database provides the following new and changed SQLScript features.

- Named procedure parameters
- Default values for procedure parameters
- Enabling variable scope nesting
- Results of queries executed with dynamic SQL will be appended to the procedures result iterator.
- Enabling DDL inside a procedure that leads other SQLScript procedure re-validation
- Performance optimizations
- Table functions

## Related Information

[SAP HANA SQLScript Reference](#)

## 12 Related Information





Here you find related information like important SAP HANA SAP Notes.

### 12.1 Important SAP Notes

Read the following SAP Notes before you start the installation. These SAP Notes contain the latest information about the installation, as well as corrections to the installation documentation.

Make sure that you have the most up-to-date version of each SAP Note, which you can find on SAP Service Marketplace at <https://service.sap.com/notes>.

SAP Note Number	Title
<a href="#">1514967</a>	SAP HANA: Central Note
<a href="#">2075266</a>	SAP HANA Platform SPS 09 Release Note
<a href="#">1523337</a>	SAP HANA Database: Central Note
<a href="#">2000003</a>	FAQ: SAP HANA
<a href="#">1944799</a>	SAP HANA Guidelines for SLES Operating System
<a href="#">2009879</a>	SAP HANA Guidelines for Red Hat Enterprise Linux (RHEL)
<a href="#">2013638</a>	SAP HANA DB: Recommended OS settings for RHEL 6.5
<a href="#">2089797</a>	SAP HANA Content
<a href="#">1681092</a>	Support for multiple SAP HANA databases on a single SAP HANA appliance
<a href="#">1976729</a>	Application Component Hierarchy for SAP HANA
<a href="#">1661202</a>	Support for multiple applications on SAP HANA
<a href="#">1828400</a>	SAPUI5 tools disappeared after updating HANA Studio
<a href="#">1917938</a>	Migrating the Statistic Server During Update to SPS 07
<a href="#">1927949</a>	Standard Behavior for SAP Logon Tickets
<a href="#">1577128</a>	Supported clients for SAP HANA
<a href="#">1514966</a>	SAP HANA: Sizing SAP HANA Database

SAP Note Number	Title
<a href="#">1637145</a> 	SAP BW on HANA: Sizing SAP HANA Database
<a href="#">1793345</a> 	Sizing for Suite on HANA
<a href="#">1824819</a> 	Optimal settings for SLES 11 SP2 and SLES 11 for SAP SP2
<a href="#">1597355</a> 	Swap space recommendation for Linux  For the SAP HANA system there are no special requirements regarding swap space.

Check the current SAP Notes for the various parts of SAP HANA by searching for any of the following application areas:

#### *SAP HANA Application Services*

- [HAN-AS](#) SAP HANA Application Services
- [HAN-AS-INA](#) SAP HANA InA Tools and Infrastructure
- [HAN-AS-INA-FLY](#) SAP HANA InA Firefly
- [HAN-AS-INA-SVC](#) SAP HANA InA Service
- [HAN-AS-INA-UI](#) SAP HANA InA Toolkit, Fiori Search UI
- [HAN-AS-MDS](#) SAP HANA Multidimensional Service
- [HAN-AS-RPO](#) SAP HANA Repository
- [HAN-AS-RST](#) SAP HANA Development Environment REST API
- [HAN-AS-RUL](#) SAP HANA Rules Framework
- [HAN-AS-XS](#) SAP HANA Extended Application Services
- [HAN-AS-XS-ADM](#) SAP HANA XS Administration
- [HAN-AS-XS-JOB](#) SAP HANA XS Scheduled Jobs
- [HAN-AS-XSA](#) SAP HANA XS Basis Applications
- [HAN-AS-XSA-GW](#) SAP HANA Gateway Services
- [HAN-AS-XSA-LIB](#) SAP HANA XS Libraries
- [HAN-AS-XSA-SHN](#) SAP HANA Interactive Education (SHINE Model)
- [HAN-AS-XSA-TM](#) SAP HANA Task management
- [HAN-AS-XSA-WF](#) SAP HANA Workflow

#### *SAP HANA Cockpit*

- [HAN-CPT](#) SAP HANA Cockpit
- [HAN-CPT-ADM](#) SAP HANA Administration Core
- [HAN-CPT-BAC](#) SAP HANA Backup and Recovery
- [HAN-CPT-DYT](#) SAP HANA Dynamic Tiering Administration
- [HAN-CPT-ETS](#) SAP HANA Extended Transaction Services Administration
- [HAN-CPT-SDS](#) SAP HANA Smart Data Streaming Administration
- [HAN-CPT-UM](#) SAP HANA User Management
- [HAN-CPT-XS](#) SAP HANA XS Administration

#### *SAP HANA Database*

- [HAN-DB](#) SAP HANA Database
- [HAN-DB-AFL](#) SAP HANA Application Function Library
- [HAN-DB-AFL-DQ](#) SAP HANA Data Quality Library
- [HAN-DB-AFL-PAL](#) SAP HANA Predictive Analysis Library
- [HAN-DB-AFL-SAL](#) SAP HANA Self Service Analytics Library
- [HAN-DB-AFL-SCA](#) SAP HANA Supply Chain Algorithm Library
- [HAN-DB-AFL-SOP](#) SAP HANA Sales and Operations Planning
- [HAN-DB-AFL-UDF](#) SAP HANA Unified Demand Forecast
- [HAN-DB-BAC](#) SAP HANA Backup and Recovery
- [HAN-DB-CDS](#) SAP HANA Activation of HDBDD-files (CDS Definitions)
- [HAN-DB-CLI](#) SAP HANA Clients (JDBC, ODBC)
- [HAN-DB-ENG](#) SAP HANA DB Engines
- [HAN-DB-ENG-BW](#) SAP HANA BW Engine
- [HAN-DB-ENG-GPH](#) SAP HANA Graph Engine
- [HAN-DB-ENG-GPH-API](#) SAP HANA Graph Engine API
- [HAN-DB-ENG-GPH-WIP](#) SAP HANA Graph Engine Wipe
- [HAN-DB-ENG-IM](#) SAP HANA Information Management Platform
- [HAN-DB-ENG-PLE](#) SAP HANA Planning Engine
- [HAN-DB-ENG-SPA](#) SAP HANA Spatial Engine
- [HAN-DB-ENG-TXT](#) SAP HANA Text Engine
- [HAN-DB-ENG-VE](#) SAP HANA Velocity Engine
- [HAN-DB-EPM](#) SAP HANA Enterprise Performance Management Platform
- [HAN-DB-EPM-PLT](#) SAP HANA EPM Platform
- [HAN-DB-EPM-XSL](#) SAP HANA EPM XSJS library
- [HAN-DB-HA](#) SAP HANA High Availability
- [HAN-DB-LVC](#) SAP HANA integrated liveCache
- [HAN-DB-MDX](#) SAP HANA MDX Engine/Excel Client
- [HAN-DB-MON](#) SAP HANA Monitoring
- [HAN-DB-PER](#) SAP HANA Database Persistence
- [HAN-DB-R](#) SAP HANA Integration with R
- [HAN-DB-SCR](#) SAP HANA SQL Script
- [HAN-DB-SDA](#) SAP HANA Smart Data Access
- [HAN-DB-SEC](#) SAP HANA Security and User Management
- [BC-DB-LCA](#) SAP HANA liveCache Applications
- [BC-CCM-HAG](#) SAP Host Agent
- [SV-SMG-DIA](#) SAP Solution Manager Diagnostics Agent

#### [SAP HANA Data Provisioning Services](#)

- [HAN-DP](#) SAP HANA Data Provisioning Services
- [HAN-DP-DS](#) SAP Data Services
- [HAN-DP-DXC](#) SAP HANA Direct Extractor Connector
- [HAN-DP-LTR](#) SAP Landscape Transformation Replication Server
- [HAN-DP-REP](#) SAP Replication Server

#### [SAP HANA Dynamic Tiering](#)

- [HAN-DYT](#) SAP HANA Dynamic Tiering

## *SAP HANA Information Composer*

- [HAN-IC](#) SAP HANA Information Composer

## *SAP HANA Lifecycle Management*

- [HAN-LM](#) SAP HANA Lifecycle Management
- [HAN-LM-APP](#) SAP HANA Application Lifecycle Management
- [HAN-LM-INS](#) SAP HANA Installation
- [HAN-LM-INS-DB](#) Installation of HANA Database
- [HAN-LM-INS-SAP](#) Installation of SAP Systems on HANA
- [HAN-LM-PLT](#) SAP HANA Platform Lifecycle Management
- [HAN-LM-UPG](#) SAP HANA Upgrade
- [HAN-LM-UPG-DB](#) Upgrade of HANA Database
- [HAN-LM-UPG-SAP](#) Upgrade of SAP Systems on HANA

## *SAP HANA Smart Data Streaming*

- [HAN-SDSS](#) SAP HANA Smart Data Streaming

## *SAP HANA Studio (Eclipse)*

- [HAN-STD](#) SAP HANA Studio (Eclipse)
- [HAN-STD-ADM](#) SAP HANA Administration
- [HAN-STD-ADM-BAC](#) SAP HANA Backup and Recovery (Studio)
- [HAN-STD-ADM-DBA](#) SAP HANA Database Administration and Monitoring
- [HAN-STD-ADM-PVZ](#) SAP HANA Plan Visualizer
- [HAN-STD-ADM-SEC](#) SAP HANA Security and User Management (Studio)
- [HAN-STD-DEV](#) SAP HANA Development Tools
- [HAN-STD-DEV-CDS](#) SAP HANA CDS Tools
- [HAN-STD-DEV-CDS-GRA](#) SAP HANA CDS Graphical Modeler
- [HAN-STD-DEV-DP](#) SAP HANA Data Provisioning Modeler
- [HAN-STD-DEV-EPM](#) SAP HANA EPM Modeler
- [HAN-STD-DEV-MOD](#) SAP HANA Analytical Modeling
- [HAN-STD-DEV-MOD-CLT](#) SAP HANA Analytical Modeling - Client Component
- [HAN-STD-DEV-MOD-SRV](#) SAP HANA Analytical Modeling - Server Component
- [HAN-STD-DEV-REF](#) SAP HANA Tools for Where-used, Refactoring and Mass Copy
- [HAN-STD-DEV-RUL](#) SAP HANA Rules Editor
- [HAN-STD-DEV-SCR](#) SAP HANA SQL Script Editor/Debugger
- [HAN-STD-DEV-TP](#) SAP HANA Tools Platform / Team Provider
- [HAN-STD-DEV-TP-CM](#) SAP HANA Development Change Management
- [HAN-STD-DEV-UIS](#) SAP HANA UI Integration Services
- [HAN-STD-DEV-UIS-FLP](#) SAP HANA Fiori Launchpad
- [HAN-STD-DEV-XS](#) SAP HANA XS Editors and Wizards

## *SAP HANA Web IDE*

- [HAN-WDE](#) SAP HANA Web IDE

## *SAP HANA Database (CCMS, Porting and DB Interface)*

- [BC-DB-HDB-CCM](#) CCMS for SAP HANA



- [BC-DB-HDB-POR](#) DB Porting for SAP HANA
- [BC-DB-HDB-SYS](#) SAP HANA database interface/DBMS

#### *End User Clients*

- [BI-BIP, BI-BIP-CMC](#) Business intelligence platform (formerly known as BOE)
- [BI-RA-EXP](#) SAP BusinessObjects Explorer
- [BI-RA-CR, BI-BIP-CRS](#) SAP Crystal Reports
- [BI-RA-XL](#) Dashboard Designer
- [BI-BIP-IDT](#) Information design tool
- [BI-RA-WBI](#) Web Intelligence
- [BI-RA-AO-XLA](#) MS Excel Add-In

The search also supports using the wildcard asterisk (\*), so you can, for example, also search for BC-DB-HDB\* or similar and you will get results for all sub-components.

## Reporting Incidents

If you encounter any problems with the software, report an incident on the SAP Service Marketplace at <http://service.sap.com/incident>.

In addition, the Customer Interaction Center (CIC) is available 24 x 7 in every region to help you resolve any issues you may run into (<https://service.sap.com/supportcenters>).

The CIC requires a valid S-user number. To create an S-user ID, follow the steps in this guide ([SAP Active Global Support Reference Guide](#)).

When reporting an incident, you can choose from the above list of components for the relevant software part.

There are several types of licenses available for SAP HANA. Depending on the license type of your SAP HANA installation, some of the features and tools that are described in the SAP HANA platform documentation may only be available via the SAP HANA options, which may be released independently of an SAP HANA Platform Support Package Stack (SPS). Although various features included in SAP HANA options are cited in the SAP HANA platform documentation, customers who only purchased the license for the base edition of the SAP HANA platform do not have the right to use features included in SAP HANA options, because these features are not included in the license of the base edition of the SAP HANA platform. For customers to whom these license restrictions apply, the use of features included in SAP HANA options in a production system requires purchasing the corresponding software license(s) from SAP. The documentation for the SAP HANA optional components is available in SAP Help Portal at [http://help.sap.com/hana\\_options](http://help.sap.com/hana_options). For more information, see also [SAP Note 2091815 - SAP HANA Options](#). If you have additional questions about what your particular license provides, or wish to discuss licensing features available in SAP HANA options, please contact your SAP account team representative.

---

# Important Disclaimer for Features in SAP HANA Options

There are several types of licenses available for SAP HANA. Depending on the license type of your SAP HANA installation, some of the features and tools that are described in the SAP HANA platform documentation may only be available via the SAP HANA options, which may be released independently of an SAP HANA Platform Support Package Stack (SPS). Although various features included in SAP HANA options are cited in the SAP HANA platform documentation, customers who only purchased the license for the base edition of the SAP HANA platform do not have the right to use features included in SAP HANA options, because these features are not included in the license of the base edition of the SAP HANA platform. For customers to whom these license restrictions apply, the use of features included in SAP HANA options in a production system requires purchasing the corresponding software license(s) from SAP. The documentation for the SAP HANA optional components is available in SAP Help Portal at [http://help.sap.com/hana\\_options](http://help.sap.com/hana_options). For more information, see also [SAP Note 2091815 - SAP HANA Options](#). If you have additional questions about what your particular license provides, or wish to discuss licensing features available in SAP HANA options, please contact your SAP account team representative.

---

# Important Disclaimers and Legal Information

## Coding Samples

Any software coding and/or code lines / strings ("Code") included in this documentation are only examples and are not intended to be used in a productive system environment. The Code is only intended to better explain and visualize the syntax and phrasing rules of certain coding. SAP does not warrant the correctness and completeness of the Code given herein, and SAP shall not be liable for errors or damages caused by the usage of the Code, unless damages were caused by SAP intentionally or by SAP's gross negligence.

## Accessibility

The information contained in the SAP documentation represents SAP's current view of accessibility criteria as of the date of publication; it is in no way intended to be a binding guideline on how to ensure accessibility of software products. SAP in particular disclaims any liability in relation to this document. This disclaimer, however, does not apply in cases of wilful misconduct or gross negligence of SAP. Furthermore, this document does not result in any direct or indirect contractual obligations of SAP.

## Gender-Neutral Language

As far as possible, SAP documentation is gender neutral. Depending on the context, the reader is addressed directly with "you", or a gender-neutral noun (such as "sales person" or "working days") is used. If when referring to members of both sexes, however, the third-person singular cannot be avoided or a gender-neutral noun does not exist, SAP reserves the right to use the masculine form of the noun and pronoun. This is to ensure that the documentation remains comprehensible.

## Internet Hyperlinks

The SAP documentation may contain hyperlinks to the Internet. These hyperlinks are intended to serve as a hint about where to find related information. SAP does not warrant the availability and correctness of this related information or the ability of this information to serve a particular purpose. SAP shall not be liable for any damages caused by the use of related information unless damages have been caused by SAP's gross negligence or willful misconduct. All links are categorized for transparency (see: <http://help.sap.com/disclaimer>).





[www.sap.com/contactsap](http://www.sap.com/contactsap)

© 2015 SAP SE or an SAP affiliate company. All rights reserved.  
No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP SE or an SAP affiliate company. The information contained herein may be changed without prior notice.  
Some software products marketed by SAP SE and its distributors contain proprietary software components of other software vendors. National product specifications may vary.  
These materials are provided by SAP SE or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.  
SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP SE (or an SAP affiliate company) in Germany and other countries. All other product and service names mentioned are the trademarks of their respective companies.  
Please see <http://www.sap.com/corporate-en/legal/copyright/index.epx> for additional trademark information and notices.